FOURTH ANNUAL REPORT

OF THE

STATE BOARD OF HEALTH

OF THE

STATE OF CONNECTICUT,

FOR THE

Fiscal Year Ending November 30, 1881.

Printed by Order of the Legislature.

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State of Connecticut.

Office of the State Board of Health,

State House, Hartford, Dec., 1881.

To His Excellency, H. B. Bigelow,

Governor of the State of Connecticut.

Sir: In compliance with the laws of this State, I have the honor to present to you the report of the State Board of Health for the year ending Nov. 30, 1881.

Very respectfully,

C. W. CHAMBERLAIN, M.D.,

Secretary of the Connecticut State Board of Health.

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GENERAL REPORT.

A general review of the progress of State medicine and public hygiene during the past year shows very encouraging results, and presents a very satisfactory outlook for the future. The claims of public hygiene have been more generally recognized by both State and national governments, and more systematic efforts have been made to prevent the introduction and spread of preventable diseases, by measures like the general quarantine act, which includes a well-digested plan for internal quarantine wherever needed. The voluntary sanitary associations that have sprung up all over the land, as the outcome of public necessity in some instances, in others from a recognition of the great benefits to be derived from such concerted action, are an exceedingly interesting feature in the development of sanitary science. The work that they have accomplished in many instances furnishes repeated demonstrations of the power of sanitary measures in preventing epidemic diseases, were such needed. The sanitary council of the Mississippi valley and the auxiliary sanitary association of New Orleans are examples of the first order. Not less valuable, in their respective fields, are the voluntary associations of those that realize the necessity and importance of sanitary work, and are interested in the rapid developments of its scientific aspects. The sanitary associations of Lynn and Newport are examples of this order. An illustration of the important work accomplished by such societies, is given by the recent examination of the water of the different wells in Newport, showing conclusively that almost invariably it was unfit for drinking purposes, being loaded with organic matter, that is, with the products of decay of animal and vegetable substances. The recent ill-health of many of the inhabitants is perhaps thus accounted for. It is seldom considered that a well drains the surface around it often from an area whose diameter is three times the depth of the well, depending upon the nature of the soil and geological formation.

Few wells reach in reality what is called a spring, that is, water collected from a higher level. which thus finds an outlet, but most wells are mere shallow pits, depending entirely upon surface drainage. In a new. sparsely settled country, where the ground receives but little contamination, the water is good enough, unless the well is placed, as is very often the case, too near a privy vault or cesspool. But as the population increases, as a matter of course the amount of filth increases, the soil becomes more or less saturated, and the water of the wells polluted. The time will indeed come when, as in many places in the old world, the garbage and filth of towns and villages will be at least once a day removed, instead of being stored up to pollute earth, air, and water. There is no greater nuisance than this storage of the accumulated filth of years, until the ground is honey-combed with covered pits of corruption. It has been conclusively shown that the germs of disease thus buried retain their vitality for years, and if brought to the surface, or carried into drinking water, are capable of again reproducing the original disease. This is especially true of typhoid fever, as it is now generally conceded that the germs of this disease are actively produced in the body during the continuance of the fever, and are thrown off by the excretions. The formation of these voluntary sanitary associations in cities and towns cannot be too strongly urged. The rural improvement societies might add this department to their work without another separate organization. Although the desirability of shade trees in proper places is cheerfully admitted, the free use of the axe would in very many cases be the first recommendation of the sanitarian. Where trees shut out the sunlight from the house, and are so near it as to induce decay of the outer wood-work from the dampness they cause, they are unmitigated nuisances; and when the shade is so dense as to exclude the sunlight from the ground, they are so no less. The rays of the sun bring light, heat, and chemical or actinic power, and so are great purifiers.

The past year has also witnessed a great activity in the organization of local boards of health in the country generally, as well as in our own State. The State Board of Health has had more applications for counsel and advice during the past year than previously since its organization. One cause, it is true, has been the appearance of small-pox in many places, but apart from this the interest, zeal, and activity of local Boards has been very marked, contrasted with their former apathy and indifference.

Some have appointed health officers, usually selecting some physician interested in sanitary work, and others have delegated their powers to a more compact committee, of three usually, who report occasionally to the full Board. The progress in this direction has been very encouraging and commendable, and the outlook for the future is promising of better results. One by one towns try the effect of extensive drainage. A fuller account of the action of New Milford in this direction is given elsewhere. Of course it is too soon to expect results as yet, but nevertheless there has been a steady decline in the frequency of malarial diseases.

The progress of State medicine in other States has been exceedingly gratifying, the increased powers given to several State Boards of Health, and the active work of several of the new boards, as that of New York State for instance, is another illustration of progress. The action of several State medical societies entirely unsought on the part of the respective State Boards of Health is an indication of how State medicine is regarded by the medical profession generally, as in West Virginia, where the medical society voluntarily contributed a large sum, to increase the appropriation by the State which they regarded as too small; similar action was reported from one or two other States at the last session of the American Public Health Association. The legislature of Minnesota has followed the lead of Michigan and voluntarily increased the salary of the secretary of the State Board of Health, so that he can devote his chief energies to the work.

The cordial endorsement by our own State medical societies of the work of the State Board of Health was exceedingly gratifying. Similar action was taken in all States having State Boards of Health, and the desirability of such an organization was as emphatically asserted in others where the State legislatures have not seen fit as yet to create such boards. Indeed, the universal and emphatic official action of every State medical society in this country is in favor of State Boards of Health, and that very emphatically. It is true that from various motives here and there individuals, *even physicians*, have virulently attacked such organizations, and have not hesitated to impute unworthy motives, and to decry and belittle their work. But the outspoken verdict of the profession generally throughout this country is in favor of such boards, and against their maligners. It is not expected that no mistakes will be made, nor is just criticism unwelcome. The field is a large one, the problems presented would tax the brain of the

wisest philosopher that ever lived, and an honest, earnest endeavor after the right clue in a most entangling labyrinth is too often the only course open. Sanitary science as a science, is new and generally but little understood. Considering the time of its development, the achievements have been most rapid and wonderful.

It is also gratifying to announce that several States have created State Boards of Health since our last report was issued. West Virginia, Indiana, Arkansas, and New Hampshire have wheeled into line. There are now twenty-seven State Boards of Health, seven of which have been created within the last two years; and in other States the movement for the establishment of such board, is well under way. At the present rate, in a few years every State will have its Board of Health; the progress in this direction in the last few years has indeed been exceedingly rapid. There is, too, a singular misconception or misstatement of the claims of sanitary science. Its principles are clear and involve no other than rational processes. It is a fact too plain to require demonstration, that a large percentage of sickness and death is preventable,—not all, as some of its enemies imply, but a large portion,—it is against this that the warfare is waged, and to diminish this percentage is the work of the sanitarian.

There are two elements in the problem: heredity and environment. The personal element is included in the first. Oftentimes a lovely character is developed from two vile parents, so perfect health is sometimes found among the most squalid filth—but in neither case is this the rule. In the fight against preventable sickness and death, when the medium by which disease is conveyed is known, as in the case of typhoid fever, the problem is very much simplified, as our efforts can be directed against the cause. In contagious diseases the problem is again complicated, as we have to contend against those causes that produce the disease *de novo*, and its introduction and spread by contagion. This is often overlooked in explaining the phenomena of disease. Again, the virus of the disease may be exhaled into the air, or if the case be very malignant, the virus or germs may acquire an intenser activity and exert their influence through unusual distances; all these elements complicate the problem. Still the degree of success obtained in the face of all discouragements is so great that our efforts are more than repaid.

In other instances the endeavor is to remove causes that are somewhat general or universal, and agencies that are obscure,

whose action is more or less theoretical, where the effects produced are the only criteria of action; that is, by the removal of certain materials the general health and longevity is increased, and by their continuance the reverse effect is produced, as in the contest against filth. It is right here that the most common misconceptions arise. Because of our earnest crusade against filth it is often asserted and oftener implied that to the sanitarian the only requisite for the production of disease is filth. This is an error. The fight against filth—using the term in its sanitary sense—is so bitter because experience has shown that it furnishes an essential element for the origin and development of the germs of disease, and the best medium for their dissemination. As these germs of disease have by some been considered as the very quintessence of filth, the confusion may have thus arisen. It is true there are those that hold that germs of disease are produced directly from filth either developed as such at first, or that the organisms inseperably connected with the processes of decay, and developed thereby may be still farther changed into poisonous germs. Others claim that the comparatively inert germs excite a simple inflammation, and in the processes of this inflammation virulent germs are developed.

There is, however, a pretty universal agreement that filth alone does not produce disease except through the intervention of a germ or virus. Here two classes branch; the one holding that the germ of disease must be introduced from without somewhere. No one knows whence these wandering germs come, or by what agency they are brought in at the proper moment. The other, as before stated, believing that under proper circumstances the germs of disease are directly, or indirectly, produced from filth. There are, of course, those that deny any causative relation of filth to disease. In whichever way the virus or germs of disease originate, it is almost mathematically demonstrated that filth is a link in the chain, and an essential one; removing that, we have then the element of contagion to combat. This, of course, relates to those diseases comprehensively called filth diseases, that is, so far as causation is concerned; but an additional incentive to the removal of filth is the depressing and unfavorable influence exerted upon all types of disease and upon health generally. In fine, then, we fight against filth, because it is a foe to health and life. What its specific action is may be, and no doubt is, an exceedingly interest-

ing question for study. It is enough, however, for us that it is inimical to health and life, and of this it does not seem that there can be a question.

Diseases Prevalent during the Year.

The sanitary history of the year has, on the whole, been more favorable than that of the preceding year. There have been fewer local epidemics, and no disease has prevailed as extensively as the general epidemic of measles last year. Typhoid fever is the disease that has shown the most marked increase. This reached its lowest point in 1879, when there were only 159 deaths reported from that cause, while the average for the ten years ending with 1879 was 370. The increase commenced in 1880 and has continued steadily ever since. Massachusetts reports the same relative facts. The increase of malarial fevers was supposed to have caused the decrease in the prevalence of typhoid. This year typhoid is reported in many towns where there had not been a pure case since the advent of malaria,—ranging from 1861 to 1874 in different towns. In others both typhoid and typho-malarial fevers were reported as existing side by side. In the eastern part of the State, where there has been no malaria as yet, the same increase in the frequency of typhoid was noted; in fact, in some places, it was so frequent as to almost merit the name of an epidemic. The cities and larger towns also report more cases than for a long time.

Diarrheal Diseases.

These, as well as typhoid fever, appeared unusually early, and were productive of more than the usual percentage of mortality. This was especially true of cholera infantum, which was very persistent and malignant. The mortality in several of the cities was considerably increased from this cause. Owing to the long continued hot, dry weather, the disease kept up its high rate for a much longer period than usual, extending even into October. Dysentery and bilious diarrhea among adults were quite prevalent, more especially the latter. In many instances the bilious diarrhea preceded typhoid fever, and as well as the latter showed a tendency towards hemorrhage, especially in malarious districts.

Small Pox.

This loathsome scourge has appeared in many of our cities and towns, and has been for the most part carefully managed. In one

town a case of small-pox was discovered, and before arrangements were made for its disposal the patient coolly took the train for another place. Fortunately upon arrival the disease was at once recognized and the quarantine prompt. The fact that the greatest danger of spreading the disease occurs during convalescence of the patient, when shedding the scabs and finer scales from the skin, is not as well known as it should be The disease is more readily conveyed by the emanations from the skin than in any other way. This explains why the disease is not oftener spread by patients during the first stages, from being about and coming into contact with many other persons, none of whom suffer.* The advice of the State Board was repeatedly sought, and the pamphlet of instructions on the prevention of small-pox widely called for. Besides those sent out, directly a case was learned to exist in any town, over five hundred copies have been directly called for. This publication has received the warmest endorsement of leading sanitary authorities at home and abroad. Upon the recommendation of the *British Medical Journal* several English health officers in large cities sent for copies, and from many cities in other States similar requests have been made. So our work has not been wholly in vain. In but few of the towns was there any spread of the disease. In one instance a case was buried without a permit, and tho sexton prosecuted and fined according to law. The disease gained headway in one place by the carelessness of two men hired to bury a person that had died of small-pox. Returning in an intoxicated condition they threw their clothing upon the beds of their children, and thus communicated the disease in one instance at least, but the families of both men were attacked. As vaccination had been neglected the disease spread to a considerable extent. In two of the manufacturing cities, where vaccination had been neglected, there was almost an epidemic. The experience of Hartford affords a strong argument in favor of vaccination. Although cases of small-pox are introduced every year from without, and often several, there has been no spread of the disease since the city has adopted the plan of systematic vaccinations, at the public expense, once every two or three years. The cases have lately been mainly among the Swedes.

In one town the clothes of a small-pox patient that had been buried were dug up and worn, and the disease thus caused. In another the bedding was carelessly exposed, and one or two chil-

* It is not meant that there is then no danger, but that it is slighter.

dren that played upon it were attacked. Another illustration of the less degree of danger of communicating the disease early was afforded by a German barber, who persisted in his trade after his child was broken out with small-pox. Whether prompt vaccination was the means of preventing the small-pox is an open question. At any rate it was promptly performed. The barber's child died, and an old man who was exposed; no other cases. In one or two instances cases resulted from concealment of the disease. The extreme penalty of the law should be inflicted in such cases. Taking into consideration its re-appearance in several cities after a considerable interval of time, small-pox has appeared over thirty times in the State this year. The few instances where a second case has resulted, and the fewer still where anything like an epidemic has taken place, speaks well for the sanitary knowledge and observance of vaccination within this State. Early in the year a general circular was issued, advising general vaccination very strongly, and considerable attention was paid to it. Whenever a case of small-pox has appeared all the people in the vicinity have flocked to be vaccinated, and in thus doing have acted wisely. Attention has again been called to the subject, lest any may have been negligent. The subject of vaccination is fully discussed in Dr. Lindsley's paper, which is a very timely production. At the present time small-pox is known to exist in three towns, and probably there are other cases. The following history of the way the disease was managed in New Canaan is typical of the experience of other towns, except that perhaps unusual promptness in securing a proper pest-house was shown. The plan advised by the Board has been adopted in some instances. Adjoining towns might readily build one jointly in some place easy of access to both. The condition of the pest-houses in some cities is disgraceful. In few, if any, are there any provisions made for convalescents or suspected cases, except the room where known cases are taken, and the heating and ventilation are on a par with the cooking arrangements. I do not know of any that have arrangements proper for disinfecting clothing and the like, as advised in our plan.

"The first patient was a domestic who contracted the disease in New York. Just as soon as Dr. Brownson discovered the nature of her disease, he notified the selectmen, who immediately looked about for a proper place to remove her so that the disease might not be spread. Several places were examined, and at last an old and unoccupied house was selected. It stands isolated from any other

dwelling, the nearest house being nearly a quarter of a mile away, and is the only house upon the street. Travel was shut off, which did not inconvenience the public greatly, owing to the location of other roads in the vicinity. We admire the judgment of the selectmen in their choice of a hospital, and they should receive the approval of every good citizen. This first patient's disease proved to be the confluent small-pox, one of the worst forms of this foul plague. The next patient was a young student of Dr. Brownson's, who volunteered to treat the unfortunate woman. He was attacked with a light form of varioloid. He immediately took up his residence at the pest-house, and continued there until all danger was passed. The third and fourth cases were a lady and her child, who exposed themselves while at "Whistleville," in Norwalk. These two latter only had a light form of varioloid. No resident of this town has "caught" the disease from the four persons above mentioned, and this fact alone ought to be a sufficient guarantee that all the care necessary has been taken by the physician and authorities. The selectmen have used all the economy consistent with safety and comfort, and it is our honest opinion that it would have been hard work indeed to have found a set of men who could or would have handled this affair as well as those now in authority. Give honor where honor is due. At the present writing there is no known case of small-pox or varioloid in town."

It is earnestly advised that a law be passed requiring all children to present a certificate from some reputable physician that they are protected from small-pox by satisfactory vaccination. The disease has so often been introduced of late by emigrants that it would almost seem advisable to have an inland quarantine for such on entering the State, requiring vaccination before they are allowed to scatter over the State. Some States have done this recently. The action of the government requiring vaccination before they are permitted to land from emigrant ships may prove sufficient. One or two instances where paper stock was the medium of conveying the contagion should have been mentioned.

Malarial Diseases

have certainly held their own this year; indeed the mortality is rapidly increasing, as when they first appear there are but few fatal cases. The results of such investigations as have been made are given later; these will be supplemented by studies of the local manifestations, and, in connection with the National Board of Health, it is expected that the bacillus malariae theory will be tested here, or some other experimental tests made as to the

origin of the disease. The report of General Viele and the map by Gen. Ellis will afford better opportunities for future study. The Connecticut River is shown in accordance with the surveys made by Gen. Ellis for the United States government, and the map is one of exceeding value. There have been no marked extensions of the disease. Singularly enough the same limit marks its easterly extent as in colonial days. and to a great extent it revisits its old haunts. For several years it has halted on the west bank of the Thames and its tributaries. The disinclination to pass rivers, if I may so express it, is a very marked feature. There have been several local epidemics, the most marked at Thompsonville, where a hundred cases nearly, with some typho-malarial, occurred about the same time. This is of too recent occurrence to be fully discussed at present. In the New Haven region generally there has been a less number of cases as a rule, but with some exceptions the same remarks would apply to the malarial territory generally. The extension northerly and easterly has been by leaps from Ashley Falls to Sheffield, from Sheffield to Lenox. The history is nearly the same in the valley of the Connecticut. Suddenly several hundred cases appeared in Springfield, leaping from Enfield; then the next jump was to Holyoke.* From Lyme on the Sound, or from some other place, it made the greatest vault to Cranston and the adjacent parts of Providence, a hundred odd cases at about the same time.

While not disposed to depreciate at all the effect of local causes, a careful study of the manifestations of the disease recently in New England leads me to believe that there is some other cause or causes at work that exert a more widespread influence. The study of epidemiology is as yet only a study, but careful research into this epidemic may contribute some much-needed facts. The three State Boards and the National Board of Health ought by and by to arrive at some conclusions even upon so intricate a subject as this. If New Jersey would join New York, Massachusetts, and Connecticut, the results would be still more complete. There have been no new varieties of malarial diseases; neuralgias and particularly hemi-crania have been more frequent perhaps, and supra-orbital neuralgia. The mongrel malarial fever and typho-malarial fevers are discussed later. The peculiar sudaminous rash of the latter is worthy of especial note, as it has been very marked in many cases.

* This relates to its epidemic appearance more particularly, not the first cases.

Diphtheria.

Diphtheria has not been as extensively prevalent in any one town as it was in New London last year, but there have been many cases of a severe type in Hartford, Waterbury, Niantic, and Naugatuck, and it has been reported as unusually prevalent in many other places. It has shown a marked tendency to extend through all the children in a family, and several instances are given where from three to five children have died in one family. The isolated sporadic cases, as well as those of scarlet fever, are as puzzling as ever, and favor strongly the theory of local filth origin. Several of the special cases are described later. Many houses and surroundings have been examined, and the usual careless arrangements found.

In one case the trap of a water-closet much used was ventilated into the pantry among other evils. There should be an inspection required by law of all tenement houses, and certain things insisted upon. For instance, a bath-room or water-closet should never be placed so that it cannot be freely ventilated directly into the open air. Inside water-closets are an abomination, and are almost always a source of ill health, and the same remark applies somewhat less forcibly to bath-rooms; but usually the two are combined, sometimes tucked away under a stairway, oftener, in double houses, in the middle, for cheapness in construction.

Scarlet Fever

Has been more prevalent than for many years previous. An account is given of the epidemic at Poquonnac Bridge later. Hartford, New Haven, Derby, Salisbury, and other towns reported more cases than usual, and of a severer type. Of late this disease has not figured largely in the mortality lists. Measles were very prevalent in a few places that escaped the epidemic of last year which, considering the children alone, could almost have been called pandemic. Rôtheln or German measles, Roseola, and a hybrid between measles and scarlet fever and chicken-pox, often made the diagnosis difficult between these and small-pox for a day or so, until one or the other was fully developed. It is no joke to send to the pest-house, as now managed, into an infected room, almost always, a patient whose disease proves to be roseola or German measles. If pest-houses were built upon our plan they would have a separate room for suspected cases, that could readily be

disinfected should a case of small-pox develop in it. Whooping-cough has continued to invade new territory. It seems to have something of a cyclical tendency, returning once in about so often, although the uniformity is not marked in this respect.

Cerebro spinal meningitis appears to have become endemic in nearly the same territory that is occupied by malarial diseases, but is not confined there exclusively. It has been unusually prevalent this last year, and of quite a severe type, the mortality larger than the average Formerly it appeared but rarcly, and usually in epidemic form. Erysipclas also has bcen more than usually frequent. In fine, all diseases that are favored by an unusually dry and protracted hot season have shown a marked increase, taking the whole list into consideration.

PNEUMONIA

And acute lung diseases were very frequently seen last winter and spring, extending even into the summer months. Some cases of what was apparently pyogenic pneumonia were reported. That is caused by the absorption of filth, and consequent poisoning of the blood. Still oftener are acute lung affections caused by breathing polluted air or overheated air, diminishing the powers of resistance of the lungs and rendering them particularly sensitive to atmospheric changcs, and especially to the depressing influence of cold; so that instead of quickening the flow of blood through the lungs, and in turn sending it tingling through the veins, the lungs werc chilled, the blood stagnated, disease and death induced. Catarrhal, laryngeal, and bronchial troubles, although not fatal, have been very prevalcnt.

Upon the whole, the health of the State, while from obvious reasons not as good as the average, has been better than during the preceding year. That, indeed, was a very unusually unhealthy year everywhere, and the past onc has been so to a less degree. We can congratulate ourselves most heartily, and have a right to, upon our sanitary skill when we remember how often small-pox has shown itself, under what varied circumstances and diverse surroundings, yet never has anything like a general epidemic been developed; and, as a rule, although its would-be malignancy was fully shown in the confluent type and its fatality among the primary victims, yet but few cases spread from these. So far as small-pox is concerned, during the year this preventable disease,

was for the most part prevented. While our neighbors were suffering from virulent epidemics they came among us and we went among them, but thanks to the protective power of vaccination, encountered no evil. As many towns in our State lie upon the great thoroughfares of traffic, and in many of the cities small-pox has raged, the immunity we have enjoyed shows pretty conclusively the protective power of vaccination. The increased attention to the subject of vaccination caused by these outbreaks or rather importations of small-pox (for oftentimes the disease was brought by a servant) promises still greater immunity for the future. It is also to the credit of the State that a few decent pest-houses are to be erected, where persons can be carefully treated without undue exposure, and all the accessories for disinfection and convalescence at hand. Thus while the year has not been as healthful as the average, we can congratulate ourselves on the threatened dangers escaped, and plan for the future with increased confidence.

Domestic Poisons.

This topic promises to be a perpetual one as each year brings up work in this field, new or old. The deleterious effects of tinned copper, so called, articles for domestic use of which were made in this State, was the first example that was brought to our notice. A more dangerous fabric could hardly be devised, and analysis verified the suspicion that deleterious compounds resulted from its use. It should be absolutely rejected as unsafe and undesirable to use. Two cases of poisoning from aniline dyes were brought to our notice early in the year, and others later. The first was from blue woolen wristlets; the second from a yellow wool fabric used for lining mittens; one from a blue veil, and several from dark blue stockings. The eruptions were characteristic and severe, and in several of the cases long continued. There was considerable febrile disturbance and pain. Analysis showed arsenical compounds in three instances. The yellow lining of the mittens was dyed with one of the derivatives from coal tar, said to be irritating to the skin, but containing no arsenic. In most of the cases the dye was pretty freely soluble in water.

A series of cases of lead poisoning were rather curiously caused. The farmers in a certain region bought barrels that had contained boiled oil to put cider in for drinking and also to make into

vinegar. There was a coating of litharge (oxide of lead) used in boiling the oil, upon the inside of the barrels. The acids in the cider readily dissolved this, and thus it became loaded with lead. The longer the cider was kept, of course, the more acid it generated the greater the quantity of lead dissolved.

Cases of chronic lead poisoning from cosmetics and hair dyes, containing lead, have been noted, but these are not as often brought into publicity; and, indeed, many an obscure cause of disease might be traced to this source, especially apparently obscure cerebral and spinal diseases. Ill-health thus caused comes on so insidiously that its cause is unsuspected,—a harsh, dry skin, failing appetite, dyspepsia, chronic constipation, neuralgias, and later, colic and indisputable signs supervene. Quite as often, however, convulsive attacks or some form of mental aberration keep up the deception; indeed, rarely do unquestionable symptoms supervene unless the lead accumulates in the system. The depressing effects of long continued absorption of small quantities destroys health and life oftener without any characteristic warning. Paralysis of the extensors—partial, oftener,—is the more common indication, if any be given. Almost all the popular hair-dyes and cosmetics contain lead in large quantities; the test can be made at any druggists. Dissolve the suspected substance in nitric acid. If suspended in oil. the oil may be removed by adding alcohol or ether, shaking thoroughly and filtering; then dissolve the sediment in nitric acid, dilute with water, and add a little of a solution of bichromate of potash. Chrome yellow is produced. If in a watery solution the bichromate solution can be added directly, hydrochloric acid forms a white chloride of lead, which dissolves in boiling water and may be thus distinguished from silver, which is comparatively harmless.

There has been a growing impression of late that canned meats are unwholesome. Where a soluble lead solder is used, there is no doubt that considerable lead is often dissolved, enough to do harm. But in addition to that, it is more than probable that some forms of canned goods, especially *fat* meats and acid fruits, dissolve more or less tin in two forms—*stannous* hydrate and *stannic* hydrate,—the first containing more tin than the second, and therefore more deleterious. Recent researches by a German chemist have shown this to be the case in certain instances, and his experiments have been confirmed by others. This does not always occur, and doubtless some means will be found, in the case of meats at

least, of obviating this danger. It is not as easily done in the case of fruits, nor is the danger as great, the compounds formed being less deleterious. The canning of articles of food is so necessary an industry that as a matter of course this will soon be obviated. Canned goods have made themselves such a necessity that they cannot be dispensed with. Fortunately these compounds are not invariably formed, and, the danger having been discovered, the remedy will soon follow. The nature of the compounds in case of meat is not as clear.

A case of arsenical poisoning from a bright green flocculent wall-paper was very interesting. The symptoms had long been obscure, when a physician saw the paper of the bed-chamber, and, at once suspecting it, took a sample for analysis; also some dust from the top of a dressing-case that stood in the room. The paper was found to contain a large percentage of arsenic, and the tests were unmistakable for arsenic in the dust taken as described. Upon the removal of the paper and substitution of a harmless variety, the patient soon regained health.

Special Investigations.

These have been more numerous than ever during the past year. Full details of the more important may be found in the Secretary's report. In spite of the increased attention to sanitary matters paid of late, many glaring evils were found where one would least suspect them. One may perhaps as well be mentioned here. A gentleman, quite intelligent in sanitary matters, and very much more interested than the average, had remained quiet, although often detecting quite decidedly bad odors about his house. As usual, he, like all others, was the last to admit that anything could be wrong about his own premises. By strong urging he was at last induced to make an investigation, when he found, much to his surprise, that for a long period, from a break in the main drain, the filth had been fully as much deposited beneath his basement floor as carried into the sewers. Four or more large cart-loads were carted away before clean earth was reached; the cavity was filled with clean gravel and disinfectants by the barrel, lest there should be any lurking evil. The long-continued ill health of one after another of his family, himself not wholly escaping, failed to suggest the probable cause. Similar cases of various as glaring errors might be multiplied again and again. Several local

epidemics have been studied, some of which will be found described as mentioned; in others the history is not yet complete, and they will therefore be deferred until the next report.

Trichiniasis.

The detection of trichinæ in a specimen of pork raised in this State led to the submission of a great number of specimens to be examined, and for a while work in that line was very lively. As all the members of one family. and some others that had eaten the pork, were affected, considerable interest was excited. Fortunately there were no fatal cases. In view of the general ignorance of the subject then displayed, it was deemed advisable to prepare a paper giving definite knowledge upon the subject. This paper is in the hands of Dr. Cressy, who has himself made investigations upon the subject, and, as shown by his paper in our last report, is abundantly able to discuss the contagious diseases communicable to mankind from animals. While cases originating in this State are uncommon, and it is seldom found to a dangerous extent, yet it is well to popularize knowledge upon the subject, as all dangers from this source can be readily avoided. The paper is well worth perusal.

Bad Taste and Odor in Potable Water.

This subject has excited renewed interest in several places, especially in Hartford, during the present winter. The cause does not seem to be completely understood, as the taste and odor appear and disappear with great rapidity. In a night, as it were, water that was before clear, odorless, and tasteless will be found possessed of the vilest odors and most objectionable taste. One thing appears certain, the change oftenest takes place in the pipes; for, when the water at the ponds and reservoirs is sweet and tasteless, that drawn from the faucets will oftentimes be bad smelling and taste fully as bad as it smells. Various causes have been assigned and remedies suggested. Animal and vegetable decay, especially of the minuter forms of life, have been assigned; various water plants that when bruised give similar odors have been charged with the causation; but the problem is not wholly solved as yet. Flushing the pipes and filtering have been suggested and tried as remedies with no very satisfactory results, although it is always advisable to keep the pipes clean and free from sediment.

The last cause that has been brought forward is the water plant *Spongilla fluviatilis*, which clings to sticks and other objects, and when it dies or is destroyed in the pipes produces these unpleasant results. It is, no doubt, the cause sometimes, but I do not believe that any one cause will account for all the occasions when bad odors and tastes appear. All cities have been thus afflicted at times, as far as I can learn, the Croton water at New York from a running river, and water obtained from an upland water-shed of uncultivated land, one of the best imaginable supplies of pure water, and ponded in reservoirs,—in fact, all water exposed to air and sunlight is charged more or less with the minuter forms of animal and vegetable life; and if these are oftentimes the agencies that produce the bad taste and odor, the recurrence is a matter of necessity, under the present system. I have not learned that the charge has ever been made against water derived from underground filtration, that is, where the ground-water is received from the base of a subterranean gallery and there stored, as in several cities; but all other sources of supply are open to this objection, more or less, the ponded waters from surface drainage perhaps more than others. The use of rivers to obtain supplies for large towns and cities has been suggested, as they are less liable to this fault and, as their enthusiastic advocates claim, entirely exempt. Supposing it free from these, the objection to the use of river-water is that almost all rivers are polluted with manufacturing waste and sewage, and that these elements .of pollution are worse than the occasional bad odor and taste, as in the first place the pollution is constant, while the odor and taste are exceptional and continue but a little while. If the *spongilla* be the cause, some means will soon be found to prevent its development and growth or to obviate its effects in some way. Then again, however unpleasant to the taste and smell the water may be at times, whatever the cause, whether *Algae animalculae* or *spongilla*, the water thus affected has no deleterious effect upon the public health. Of course, it is very objectionable and offensive, and one's "gorge rises against it," but the most careful observation and study has, thus far. failed to prove that any ill-health is caused thereby. If there were the slightest evidence it would be eagerly pounced upon by the advocates of river water. On the other hand, the sewage does do harm, as has been often demonstrated. It is not probable that the water is ever so proportionately loaded with manufacturing waste when it is drawn from rivers for public supply, but this

waste adds its quota to the pollution and to the amount that has to be disposed of before the water again becomes pure. It may be stated as a general rule that water that has once been polluted by sewage is never again fit to be used as a supply for drinking and cooking. It is true that under the lead of Dr. Letheby a school was formed that taught that a stream purified itself in a few miles run. But their numbers, once increasing, are now diminishing rapidly, and the strongest advocates of this view are yielding, point by point, compelled by the stern force of fact, as the methods of investigation become more delicate and we learn more of the changes that take place in polluted water. It is true that, in the first few miles run, almost all the crude sewage disappears; but no one has been able as yet to determine at what point the more intractable and less easily oxidized materials disappear. Moreover, the formed products of this oxidation of sewage, the albuminoid ammonia, the nitrites, chlorides, and the like, are not themselves entirely innocuous, and they persist for a long time, and their distance limit has not yet been fixed. But of still greater consequence is the fact that the germ of disease, or the particulate of the lowest animal or vegetable nature, or even inorganic if that be its nature, is not oxidized nor destroyed, nor is the limit of its disappearance known. This is the most important fact of all, for it is thus that disease is conveyed. Whether filth is capable of originating disease or no, it is certain that the germ or particulate of disease is capable of reproducing the disease whenever it is received into any human system adapted to receive it. As the excreta of typhoid fever and the discharges from the upper air-passages in diphtheria are cast into the sewer oftentimes, and that, in fact, the sewer receives the virus germ or particulate of every form of communicable disease, the dangers from polluted water are obvious. In fact, this is one great source of danger in all filth, that it is a carrier of the particulate element of disease. In fine, it is no adequate reason for changing the source of supply because of temporary bad tastes and odors. These, whether caused by *Algae animalculæ*, the decay of substances in the pipes, or by the *spongilla*, do not impart qualities to the water harmful to health. On the contrary, rivers polluted by sewage or other water thus polluted becomes the carrier of the germs or particulate of disease, and even, in some instances, are so loaded with sewage that enteric and other troubles are directly caused by its use. As the subject is one of con-

siderable importance and interest, and the whole question of aquatic vegetation and the lower forms of life in potable water and their significance is somewhat obscure, we have commenced systematic studies upon the subject, and expect in our next report a paper on the relation of aquatic plants to the odors and tastes in potable water, from an expert in this connection.

School Hygiene.

A paper upon a practical phase in this extensive and important subject was expected and promised until it was too late to supply the deficiency, as any contribution to this subject must be most carefully and thoroughly studied. Had notice been received in time, a paper on the injury to the development of the human brain by too early forcing the reflecting faculties, and by training and methods in advance of development of function, would have been completed in place of the one withheld. In our second report the subject was touched upon in discussing the age of seven as the proper one to be selected for the commencement of school life or any systematic training except upon the kindergarten plan. As school life in this State begins at a much earlier age, the topic is certainly worthy of the most careful consideration. There are a multitude of topics that are open for investigation here. We are accumulating facts all the time which may be collated at a future occasion, when the topics to which they relate are formally discussed.

Among other points we hope to complete some studies upon the air in school-rooms, and places of public assemblage, by a practical examination of a sufficient number of rooms, by means of recently-devised apparatus for that purpose, so that the results will be general enough to base some deductions upon. There is also a somewhat strange dearth of facts upon the influence of school life upon health of the pupils, and in what manner, and just what are the guilty factors. It is hoped to enter upon a systematic study of that topic next year, as it is doubtful if it can be completed in one year. We have considerable data on some points; for instance, the injury to the health of girls in the advanced classes by being compelled to climb many flights of stairs, inducing pelvic derangements that compel a large percentage to leave school. The primary scholars, who would be rather benefited by the exercise than otherwise, occupy the lower floors, and the older girls climb to the third story, or perhaps higher. Unhygienic punishments are not unknown the

denial of recess and afterwards retention after school, resulting in hours of agony, days of illness under a physician's care, from the enforced neglect of nature's wants, have been brought to our notice. The denial of recess as a punishment has been wisely abolished in some towns, and should be in all. The foundations of life-long misery may be laid by careless treatment during the impressionable period of school life. The plan proposed in Maryland will probably, with some modifications, be adopted. The aid of the physicians generally is to be invoked, as well as that of the various Boards of Education, and a systematic visitation and inquiry made by the family physician of each family as to the effects of school life in all its details upon their children from parents or guardians. This is in brief the plan. The educational authorities in this state, from the Superintendent of the Board of Education down, have shown the greatest interest in this department, and, under the intelligent supervision of Prof. Northrop, Connecticut is far in advance of many states in school hygiene. But the question of the best educational methods to make the most of the boy and girl that can be made out of the material is yet not wholly solved, and any contribution to the subject is as welcome to the practical educator as to the sanitarian. The educational authorities have pretty thoroughly solved the problem as to the methods by which the greatest amount of instruction can be given in a stated time. But the sanitarian is not satisfied with this result. His problem is to develop to the highest attainable point the body, as well as the mind, so that whatever intellectual training one may have it may be used by its possessor in the life struggle, not a mass of material which he must be ceaselessly adjusting, and an illy-balanced organization, brain and mind developed at the expense of muscle, physical force, and executive ability. The temptation to enlarge when once this point is touched upon is very great.

There are several practical suggestions as to legislative action that may as well be made here. One we repeat from last year: that is, that a law should be passed requiring a certificate of proper protection by vaccination from the family physician, health officer, or town physician, before a child can be admitted to any school in this state. Second, that school officers shall have power to exclude from school, children coming from a house where there is a malignant case of contagious disease until such attendance be pronounced safe by the health authorities. Third, that children that

have been sick with measles, scarlet fever, diphtheria, or small pox be required to present a certificate of health from their family physician or from the health authorities before they shall be allowed to return to school.

THE LIBRARY.

Many valuable additions have been made during the past year to the library of the Board. Our exchanges are especially valuable. Special thanks are due the Hon. J. R. Hawley, M. C., for valuable gifts. The last volume issued of the Medical and Surgical History of the War and the last Report on Food-Fishes are especially valuable. It was well remarked by the president of the American Public Health Association, "That man is often the best employed and most overworked sanitarian who is doing nothing at the moment for the citizens under his care, but who is eagerly widening the too narrow limits of his knowledge." The field is a wide one and the advancements rapid. In no other department of science are there so many new developments, and constant study is necessary in order to avail oneself of all the powers of sanitary science for the protection of the people. The library of the Board is one of its most important features, and year by year is constantly gaining in value. Our thanks are also due our President, Dr. Butler, for valuable contributions, some of them not otherwise obtainable for love nor money.

PUBLICATIONS OF THE BOARD.

The monthly sanitary reports published by the Board have increased in value each year as they have become more and more comprehensive. Comparisons can also be made to a limited extent, it is true, but this is all the while enlarging. The following remarks from an article in the New York *Journal of Commerce* are so thoroughly explanatory of this system and so appreciative that we reproduce them here.

"The Board merely calls attention to the facts, leaving local authorities to discover the immediate cause and apply sanitary remedies, if any can be found. This is about all the State Board is empowered to do, and it generally answers the purpose in Connecticut, as the people do not like to have their locality made notorious as unhealthy through the monthly bulletins of the Board. In those parts of the State which have suffered most from malaria the effect of this mild official interference has been very good. Much has been done to improve drains and sewers and to deal in the most approved sanitary fashion with all suspected sources of

disease. Therefore, while the area of malarial affections seems to be enlarging in Connecticut, their number and intensity are decreasing in the old favorite homes of those distempers, specially in the New Haven region. These changes are attributable to the judicious supervision of the Board of Health. The commissioners have not hesitated to publish bills of mortality of all the cities and towns of the State once a month, and to report, without fear or favor, the actual cause of death, accompanying these statistics with exposures of all sanitary deficiencies. Before any city which respects itself has been told twice of its culpable neglect and consequent sickly condition, the best remedies which science can suggest will be applied, and generally with happy results.

"There is need in this State for similar action on the part of the New York Board of Health. A monthly statement of the mortality of all the counties, with incisive comments on the preventable causes of death, could not fail to do some good here, as well as in Connecticut."

The last annual report was received with great favor and is the first for which there has been any considerable foreign demand. It was impossible to half supply the demand. Hundreds of applications from without the State were refused. We now have only enough to supply the rest of the states as they establish state boards. It received unqualified commendation from the highest sanitary and medical authorities in this country and abroad. The application for copies received from architects, civil engineers, and professional men, and the unsought praises that have been given to its practical character are very gratifying. These facts are not mentioned in self-laudation, but as showing the progress made and the increasing interest in sanitary literature. The appointment of several professors of public hygiene in institutions of learning is in the same line of progress as the higher place taken by sanitary literature.

The sanitary tracts on small pox, typhoid fever, diphtheria, disinfectants, rural hygiene, those explaining the nature and province of state medicine, of treatment of drowned, have all had a wide circulation and are constantly called for. Those for registrars and connected with the registration department are noticed elsewhere. The letters of inquiry received by the Board have also been much more numerous than ever and on a much wider range of subjects, generally practical questions involving sanitary principles.

LOCAL HEALTH BOARDS.

There is growing up a very pleasant relation between many of the local health boards and the State Board. Consultations are

much more frequent. The circular of instructions to local health boards as to their powers under the laws and what it should be their duty to do, as well as what they should aim to accomplish, has been delayed until after the present legislature, when a codification of the laws relating to sanitary subjects will be presented to the legislature. There are not so many changes and new provisions desirable as to disentangle the old and make plain just what the provisions of the law are when there have been new enactments and amendments upon amendments. This is particularly true with regard to the registration laws. So many changes have been made, and in some cases negligence in distinctly repealing obsolete provisions, that it is with difficulty that the law can be learned on some points, usually of minor importance, however. Still it would be better to have a plain understanding. The revision of the registration laws is in the second part of this report, where it more properly belongs. Advice has been sought, not only in relation to small pox, but also upon nearly all the range of subjects likely to come before such organizations. As present constituted, unless by special provision some more definite organization has been adopted, the selectmen and justices of the peace constitute the board of health. This is all very well, but there should be some easier way than at present for this somewhat unwieldy body to delegate their powers, or such as they may choose, to a smaller and more compact body, and to appoint a health officer, if they see fit. The manner of calling them together as a board of health should also be made a little more plain. If all the boards in cities and boroughs were directed by law to make an annual report in full of all their transactions during the current year to the city council or wardens and burgesses, and transmit a copy of the same to the State Board of Health, it would be a great improvement. At present, New Haven is the only city that sends a full report. There has been considerable grumbling and criticism concerning the New Haven Board of Health, but the results they have accomplished show that their city could well have afforded to have paid them large salaries and given them a large appropriation in place of the small sum granted. In spite of its being a seaport town, where diseases are liable to be introduced from all nations, including the plague-stricken East, through the efforts of their hard working board of health the city ranks among the six healthiest cities in the whole world, a compliment to Dr. Lindsley and his coadjutors that is well de-

served, for it is the resultant of intelligent work in the face of unbelief and reproach. As well said by Dr. White, at Savannah: "The sanitarian goes a warfare at his own charges. The sanitary work of the world has been done, and to-day is being done, for love of knowledge and love of man. I know of but one locality in the United States where those responsible for the public health are paid in such measure as railroad companies, banks, or great mercantile corporations recompense work of similar high value." How many lives saved and how much suffering and loss prevented is included in that achievement no one can justly estimate. The reduction of one per cent. in the death rate of a city like New Haven means life to hundreds that would otherwise have perished, and health to thousands that otherwise would have languished on beds of pain and sickness. Other boards are doing good work in their way. The Hartford board has been managed with exceeding intelligence and in accordance with sanitary laws, under its active and earnest head, Dr. Fuller. The New Haven board has the advantage of a compact, working organization, while the others, for the most part, have to work single-handed, unless given special powers for the occasion. Meriden has an excellent system for practical results, and a large amount of practical sanitary work has been accomplished there of late. It is very like New Haven in some respects,—that is, they have a vigilant, active, intelligent health officer to do the real work. The health board of New London have deserved great credit, working in face of considerable discouragement. They have no doubt greatly improved the sanitary condition of the city and worked to the full extent of their power. In fact, all the city health boards have been unusually energetic. The local boards of the towns must not be ignored. They also have done good work in many places, especially in contending against small pox. The appearance of this dread disease in so many places in our State, in the large majority of instances introduced by a foreigner, often an emigrant recently off ship-board, has not been an unmixed evil. In the first place, it has induced a large number of persons heretofore negligent to be vaccinated, and that thoroughly. Then it has stirred up the town boards of health to become organized more compactly, in some instances; and in all the effect has been more than transient. Other unsanitary conditions have engaged their attention.

SANITARY IMPROVEMENTS.

A full account is given of the sewerage of Stamford, Conn., by Henry R. Towne, that will well repay perusal. He explains also how they intend to pay for the work, which is a very important part of the business. This is given with such detail that all the points involved might be well understood, as they are all of importance. Since this was written, I have the report of the engineer of Denver, Colorado, sewered upon the same plan. The objection that the flush-tanks might freeze would apply here, surely, if anywhere. The house connections were underway when he wrote, so it is too early yet to see how their experience compares with Memphis, which is yet well satisfied with its system of sewers.

Mr. Latrobe, of Baltimore, makes a practical suggestion here, especially in cities that have public steam heating, but applicable by special arrangement elsewhere: that is, to have a small steam coil in each flush-tank to thaw it out or prevent its freezing in cold nights. He, after a very intelligent discussion of the two systems, advocates the small pipe or Waring system for Baltimore. It is the best presentation of the subject I have ever seen.* The objection to large sewers is well put.

"Although their slope may be good, and with the standard rainfall ample for cleansing, the section of the stream ordinarily is so small, compared with its wetted perimeter, and is so clogged by semi-fluid refuse that they cannot fulfill efficiently what we have seen is primarily the office of a sewer, viz.: to carry at once to the outlet what runs into it. The result is that the sewage moves along sluggishly, fermenting and generating the most noxious gases, until a heavy rainfall or artificial flushing hastens it to its destination. The catch-basins also become very foul in dry weather, and even when trapped the water seal may be broken by evaporation, permitting the exit of noxious and offensive gases. Under these conditions, the large unfilled area of the sewer becomes charged with gas, which, in the event of the first heavy rain is driven, by the sudden rush of water, to find its exit at any weak point, notably through the traps of house connections into the houses themselves."

I have had several intelligent gentlemen speak of the forcing of their traps on similar occasions, even the large one on the main drain, sounding to one standing near like a fiercely boiling kettle. The difficulty of flushing large sewers in a dry season, when they most need it, and that the large sewer system has reached its

*A report to the mayor and city council upon a plan of sewerage for Baltimore City. C. H. Latrobe, C. E.

most perfect development, and we cannot expect anything very much better under it, are also well urged.

The better condition of the sewage for utilization under the Waring system, when finally delivered at the outlet, the value of storm-water in clearing the streets, and the care of providing for it in other ways, are, as well as the expense, arguments in favor of the small pipe system.

"This very difficulty of deciding on a proper basis of rainfall in designing combined sewers, is in itself considerable. If possible, or even probable, storms are taken as a basis, the sewers become tunnels, expensive and ill-contrived, for the ordinary flow of sewage. If a compromise is taken (as is generally done) of one-half an inch per hour entering the sewer the result is almost inevitable that at times the lower levels, and sometimes the higher levels, are deluged with sewage, and new and expensive works have to be undertaken to supplement the old. In proof of this both Brooklyn and Providence will have to build—and are building—new sewers devoted to storm-water alone, and in Providence, at least, based on double the rainfall used in preparing the original system."

In fine the greatest objection to the large sewer system, is incapacity to carry off all the storm-water even at elevations of one hundred feet above tide, and consequent gorging.* Where the branch sewers have a very rapid inclination a main, although proportioned correctly, has been known to gorge in four minutes after water began to run in the gutters. This gorging creates a back flow through kitchen sinks and basement water-closets; the houses are invaded by sewage during heavy storms, man-hole covers lifted, and sewage poured into the middle of the streets.

He advises irrigation for the final disposal of the sewage, and gives a resume of Corfield's arguments in favor thereof. This subject was pretty fully discussed in relation to the disposal of the sewage of Meriden in our second report. It is a satisfaction to learn that the irrigation plan which this Board then unqualifiedly endorsed is gaining in favor, and is recommended for so large a city as Baltimore of nearly five hundred thousand. As we have so often recommended the system, its success is satisfactory. Memphis, Denver, Cumberland Mills, Maine, Lenox, Mass., and probably other places already have the system fully established. Stamford will have her system soon completed. New Orleans has voted to construct sewers after this plan, as well as several other cities. The plan certainly is perfect theoretically, as the sewage is carried to the outlet so rapidly and fully that no gases have a chance to form. One essential element for success is mentioned by Mr. Latrobe, the

* Condensed; not a verbal quotation from this through.

city should invariably maintain control of the system, should *own and control it.*

Thorough and systematic drainage, as well as sewerage, is unquestionably a sanitary measure; as certain as any thing can be in this variable world, to result in a general improvement in the healthfulness of any place that carries it out thoroughly. The subsoil and ground-water may be stagnant and require attention as well as the surface water. Indeed the unhealthfulness of any place is perhaps as often connected with stagnation of the subsoil water as of that upon the surface; that explains why a hillside or elevated plateau may be as good a region for malaria as lower ground, indeed a recent history of the malaria around Rome obliges one to question the paludal theory as strongly as its manifestions in Connecticut, for the hilly regions were there as much, if not more, affected than the lowlands. A house upon a hillside may be much less drained than a house in a vallcy or along a stream, for in one case the water is constantly in motion. and in the first instance stagnant. This of course is not always the case, depending upon the gelogical formation, but is much oftener than one would suppose. New Milford with the advice of the Board has, in connection with a provision for sewerage, made a great improvement iu the local drainage; a map and sketch is given of this also. They already had one large drain for the central street, and have shown a very commendable spirit in carrying out public improvements. Every instance of this kind is of value and worthy of record, for its own sake as well as for its influence upon others who, seeing the good results that follow such measures, will be encouraged to do likewise. It is our intention to give as full an account as possible of all the sanitary work of a public nature done in the state. There are several other towns agitating the question of sewage and preparing the way for the work; each has its features of local interest. Hartford has carried the sewage of a large trunk sewer through a cove to the river current. The cove is shown in the drainage map of the Connecticut and Housatonic survey. This is a great improvement. Other trunk sewers are in process of construction that will remedy the evils that affected large areas, if not the whole city. These are preparatory to dealing with the great sanitary problem that must be solved sooner or later, the treatment of Park river, whether to keep it an open sewer with an unobstructed course or to purify it by removing all sewage by a trunk sewer. New Haven is preparing to deal with a very crooked

river with hundreds of acres of swamp meadow which affords a chance for a vast amount of sanitary work. The results, however, will more than compensate the necessary outlay. Other minor improvements have been made as occasion has arisen. Wallingford and other towns are preparing to introduce a public water supply. In fact there is considerable activity all along the line. There is more need of systematic drainage, especially when natural water-courses have been interrupted, and the free movement of the ground-water hindered, where instead of a constant movement towards water courses and the sea, it is set back and rendered stagnant by embankments, reservoirs, railroad gradings, and similar agencies.

POLLUTION OF STREAMS.

There seems to be a need of farther legislation upon this subject, especially when the water is so contaminated by manufacturing wash and sewage as to be detrimental to health. An instance is described in the report, where there was a large quantity of decaying wood, principally brush-wood, in a brackish stream, that is a fresh-water river into which the tide sets. These were partially uncovered at low tide and produced a very sickening odor as described by all those living near. Oftener, however, sewage and the waste from factories and manufacturing establishments make up the polluting materials. The laws perhaps are sufficient to protect reservoirs and streams used for water supply of cities and towns. Except, perhaps, there should be a law relating to the locating of slaughter-houses and nuisances near such sources of public water supply. If this location be left to boards of health, as suggested in the last legislature, the difficulty might be obviated. It may be impossible to meet the other matter by any general law, settling each special case by a special enactment. However that may be it would seem to be an axiom that a town ought to be able to protect the purity of the streams flowing through it and to control them for sanitary purposes.

REPORT

OF THE

Ninth Annual Session

OF THE

AMERICAN

PUBLIC HEALTH ASSOCIATION.

THE AMERICAN PUBLIC HEALTH ASSOCIATION.

In accordance with the action of the State Board of Health the following report of the ninth annual meeting of this association is here presented :

The meeting was held in Savannah, Georgia, from Tuesday, November 29th, until Friday, December 2d. The attendance was large, representing the most prominent sanitarians from all parts of the Union. The papers were generally interesting and of permanent value, and the discussions lively and practical. A mere catalogue of all the papers presented would take up too much space, nor is it possible to give a brief of the views presented on the various topics discussed. It will, therefore, only be attempted to present a general idea of the nature of the proceedings, with a review of some of the points presented in papers of special interest and importance.

Captain George A. Mercer presented the address of welcome on behalf of the city of Savannah in a very eloquent and appreciative address, giving incidentally a graphic picture of the terrors of the last scourge of yellow fever. Dr. R. J. Munn addressed the association on behalf of the Georgia medical society in a very felicitous manner, extending a cordial welcome. The genial mayor of the city, John F. Wheaton, who, by the way, is a son of Connecticut, and has served his city as mayor some fifteen years, presided at this session, and after the welcoming speeches, introduced the president of the Association, who then gave the annual address in a masterly manner. After a feeling tribute to the honored dead since the last meeting, he gave a rapid sketch of the difficulties that beset the path of the earnest seeker after truth in the field of sanitary science, the apparent contradictions, the defects in vital statistics, and woeful need of carefully observed and thoroughly-recorded facts, picturing what one often sees, a healthy child growing up among unsanitary surroundings

"The air, none too savory; microscopic examination of similar atmospheres has revealed spores bacteriae, particles of animal matter, alive

and dead, but he bethinks himself of the arrangements for entangling much of this matter before it reaches the ultimate air-cells, and especially of that wonderful lining tissue of the lung, which with chemical precision lets in oxygen and lets out carbonic acid and vapor of water, yet with such certainty retaining the blood upon the other side, that one may see a thousand cases of that dread destroyer of texture and blood, yellow fever, and see but a single case of hemorrhage from the lungs, and even that in one already a consumptive. Such reflections naturally suggest the widely diverse nature of individual and race hygiene. In the shipwreck we see a single person outlasting all others of the company, defying flaming sun and winter's rigor, the pangs of hunger and the anguish of thirst, or the victim of severe accident, 'groaning with the groans of a deadly-wounded man,' yet seemingly finding it impossible to die, and to the amazement of all lookers on, and in spite of our malign prophecies, recovering health, and again doing his part of the world's work. This limitless endurance, this clenched tenacity of life and enormous vitality, are at once the evidence and result of race hygiene. These much-enduring diseases, death-resisting specimens of the human family, show what a succession of fortunately environed generations can develop."

The lack of recognition of the value and importance of the work done by sanitarians was alluded to as shown by the meagre recompense afforded. Sanitary science has reached that point where farther advance can only be secured by the expert, and he must be furnished by the State. The amateurs have done their part. When the care of the individual and the citizen is secured, then problems that involve neighboring States comes for solution, and hence the need for a central or national organization to work in this vast field.

Instruction in primary hygiene and the truths of sanitary science must be given in the schools to develop workers in this field, and there lies a vast work at our own doors to popularize in every way what is already known of sanitary truth. This brief abstract can give but a feeble idea of this fine address; it must be read in full to be appreciated.

The papers of the first day were given to the contagious diseases of cattle and those diseases of the lower animals communicable to man. Anthrax, Texas fever, trichinæ, and similar topics were discussed. after the subjects had been treated by able papers, several on each principal topic. As we are going over this ground systematically, the paper on trichinæ this year, by Dr. Cressey, succeeding that on the communicability of tuberculosis last year, there will be no necessity for more than mentioning these papers.

A paper on the comparative vital movement of the white and colored races, by Dr. S. S. Herrick, of N. O., showed the birth rate of the negroes to be higher than that of the whites, because with a higher mortality they were yet increasing. The blacks are less liable to cancerous diseases, and delirium tremens in a still more marked degree, suicide rare; on the contrary they are more subject to consumption and acute lung diseases. The last census corrects the erroneous idea that the African race is destined to disappear from this continent.

Dr. Miles, of Cincinnati, gave a very interesting account of the sunstroke mortality there in 1881. This showed, contrary to the general opinion, that a hot, dry atmosphere was more conducive to sunstroke. The large number of cases, 288, afforded a fine field for study. Temporary hospitals scattered over the city to avoid transportation, were shown to have been effectual in lessening mortality. The hot water treatment was unsuccessful in marked congestive cases, the only ones in which it was tried. The heroic treatment, by deep injections hypodermically of aqua ammonia diluted one fifth, was advised in desperate cases.

A paper written by Dr. J. F. Adams, of Pittsfield, on malaria in New England, was read, in his absence, by the secretary, Dr. Azel Ames. The rate of progress was stated as from two to thirty miles yearly; the most rapid progress in the hottest and dryest years. (In this State the most marked increase has been in the succeeding year after an unusually hot and dry season, as has been more often reported.) The subsidence of typhoid fever and its increase again last year, were noted. The greater prevalence along water courses was noted, and the statement from our monthly reports quoted, that its influence was mainly felt along the river valleys, and much more rarely in high and dry localities, although stated much more strongly than there in regard to the exemption of the highlands. Rivers, ponds, and reservoirs, especially rivers with marshy banks and overflowed bottom-lands, and the exposed beds of ponds were stated as factors, deciding its location, vegetable decay, and mud, rather than water, were more potential in influencing its development. Next to rivers and streams, reservoirs used for water power were accused as places more fertile in malaria. As will be seen, he places more stress upon local influences than is given in this report, except, perhaps, the views of Gen. Viele. Later in the session, owing to delay in

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reaching Savannah by an accident on the road, a paper was read by the secretary of this board, presenting essentially the same views as are given later in the paper on malaria. These papers drew out, both of them, a very lively and interesting discussion, as a large section of the southern members are strong believers in the theory of local origin. Dr. Campbell, of Augusta, Ga., held that malaria had always existed, but so intimately blended with the typhoidal element as to be scarcely distinguishable, instancing the difficulty of diagnosing sometimes in cases of typho-malaria fever.

One of the most interesting and instructive papers was by Hon. Erastus Brooks, a member of the New York State Board of Health. I wish I could reprint it entire and send it into every intelligent family in this State. The following brief quotations give some idea of the nature of the essay. Speaking of Diphtheria and Scarlet Fever, he says :

"Inspectors, teachers, and parents, to arrest diseases like these, owe some service to the State. Among these duties are : non-communication, isolation, safety to exposure from draughts and colds, the strict avoidance of impure water, the disinfection when required of clothing, rooms, workshops, dwellings, and of all exposed places. Where fire and heat are not applied to get rid of what is offensive, effective disinfectants must be used, and when death comes there must be no public or family funeral. To save the lives of the living by such means shows no want of sympathy for the dead or for the living, but just the contrary. One bad case of diphtheria neglected in the school-room, the sick room, or the dead room, may lead to a hundred graves. The true parent, the wise friend, the honest citizen will see that these exposures so often caused by ignorance or false sympathy are prevented by the strictest non-intercourse. . . . . The homes of the people are the real sources of happiness, and what is best for health should be established and recognized there, and in properly constructed workshops, school-rooms and churches. In the latter, physiology and physic may at times enter into that divine philosophy which teaches the ways of God to man. In a country like Belgium, the average lives of the cleanly and thrifty are fifty years, and of the filthy and negligent the average length of life is only thirty-two years, and Belgium in this respect is not a peculiar country. I read also in 13 towns of England of a decrease of more than 17 per cent. in the death rate from proper sewerage alone.

"The head of every house should be practically a health inspector. Open the doors and windows of your dormitories that the air of heaven may enter therein. Banish from your dwellings all possibilities of contamination from effete matter, all noxious and miasmatic gases from

foccal decomposition resulting from soil and sewer pipes. A little care will shut out filth and make room for the vigor of health."

A paper of permanent interest, by Dr. Folsom, was, in the absence of its author, read by title only. In view of its practical nature, it was printed in the reports of the session, and the following points are taken from it :

"The low rate of mortality from insanity is first noticed. The deaths from typhoid fever in Massachusetts are ten times as many each year, from cancer five times as many, from alcoholism not far from the same number. The total number of insane persous in the State is less than the number dyiug each year from cousumption. The increased fatality from insanity, apoplexy, paralysis, and diseases generally of the nervous system during the last twenty years too plainly indicates where the strain from our too complex and exacting life falls. The proportion of those insane increased in 20 years from 12.13 in every 100,000 of the population of the State to 17.51. This shows an increase in insanity, but not exactly proportionate to these figures, for if there were a comfortable asylum at hand they would be filled up to 5,000 instead of the 3,168 now (1880) in hospitals, but part of the increase is due to a better enumeration. In England, the increase in the pauper insane in the last 22 years was 50% of the self-supporting, 20% in 1881, 89% of the insane were paupers, hence it would appear that the causes that produce insanity were more active at the bottom of the social scale.

" In Mass. State Hospital for the insane, of 9381 males 114 were in school, of 4,673 women 52 were school girls, 166 boys and girls were of the school age. Insanity not only prevails at a time of life when the strain of mind aud body is great, but also where the effort is the most intense. The antecedents of insanity are complex and obscure; the alleged causes vary with the theories of those recording them. There is, however, a general agreement that whatever they are they are of long standing and slow development. In Mass., drunkenness and its effect upon offspring stands easily first. Ill health has been advancing as the population has become more concentrated, until it stands easily second. Heredity ranks from 4% to 90% according to different observers. There can be no doubt but that it is one of the most potent and most frequent of the direct causes of insanity. There are two points to be kept in view in the prevention of insanity: 1st. The avoidance of an accumulation of chronic insane by cure of the disease in its early stages, and secondly the prevention of first attacks of mental disease.

"The importance of the hygiene of infancy was discussed, the dangers of school life, the bad air, hurry, worry, and strain, too many branches of study, over stimulation by competitive examinations, insufficient food from lack of time, evil habits through charlatancy to which they are driven by a morbid imaginatiou. Syphilis is a rarer cause of

insanity than enforced celibacy. Impure relations of the sexes is a prominent factor in producing certain forms of insanity. At the susceptible period of brain activity, comparatively little mental disease need be feared if time enough be taken for food, healthy exercise, sleep, and recreation. If insanity threaten, the best means of avoiding it is in a healthy body and well trained mind."

There were many other valuable papers read, but time and space forbid their discussion.

A pleasant excursion down the river varied the exercises by an opportunity for social relaxation that was appreciated by all.

There were important discussions on many interesting sanitary questions, from reports of committees and arising incidentally. Professor R. C. Kedzie of Mich. was elected President; Dr. E. M. Hunt of New Jersey, 1st Vice-President; Dr. A. L. Gihon, U. S. Navy, 2d Vice-President. The Secretary, Dr. Azel Ames of Mass., is elected for three years; the efficient treasurer, Dr. J. Berrien Lindsley of Nashville, Tenn., was re-elected. The next session is held in Indianapolis. There should be many more members from this State.

AN ACCOUNT

OF THE

MOVEMENT FOR OBTAINING SEWERAGE

IN THE

BOROUGH OF STAMFORD.

BY

HENRY R. TOWNE,

STAMFORD.

THE SEWERAGE OF STAMFORD.

The Town of Stamford, Connecticut, has every natural condition needed to make it a healthful place of residence. It is located upon a deposit of gravel, extending over its whole area and of great depth. It has very little marshy or undrained ground within its limits, and had originally a clear and rapid fresh water stream upon its western boundary emptying into Long Island Sound, the shore of which latter lies about a mile south of the town.

By abusing nature's provisions, man has converted these healthful provisions into conditions the reverse of sanitary, and has continued this short-sighted and suicidal policy, until the health of the inhabitants of the town has been seriously affected, and the conviction brought home to its residents that speedy and vigorous measures of reform are necessary for their self protection.

The movement of reform first took definite shape in September, 1880, by the meeting together, informally, of some twenty or thirty of the larger tax payers of the Borough of Stamford, for a discussion of the subject, and the consideration of how best to obtain relief. At this meeting a thorough discussion of the matter was had and a free interchange of opinions as to the best mode of providing for the proper sewerage of the town took place. Recognizing that, in this, as in almost everything else, the sinews of war are *money*, a fund was raised, by voluntary subscription, with which to defray the expense of a proper survey of the borough, and the preparation by a competent sanitary engineer of a comprehensive plan of sewerage. The fund thus obtained amounted to about $500, all of which was expended for the purposes above indicated. The engineer selected by the committee having charge of the matter was Colonel George E. Waring, of Newport, R. I., who visited Stamford and carefully investigated on the spot the general questions involved. With the data thus obtained, and aided by a topographical map of the borough, Colonel Waring

designed a system of sewerage intended to cover all the built up portions of the borough of Stamford as then constituted. A reproduction of the map prepared by Colonel Waring accompanies this paper.

Having obtained Colonel Waring's report, which included an estimate of the cost of carrying out the plan of sewerage which he advised, the committee, under whose auspices his report had been made, united in a request to the borough officials that a public meeting should be called for the consideration of the subject.

At this meeting, which was held on the evening of November 12, 1880, Colonel Waring's report was read and the map accompanying it was exhibited by a stereopticon, and fully explained by one of the committee. A free discussion of the matter followed, during which it appeared that a division of sentiment existed, many persons strongly advocating the project for obtaining sewerage, while others as strenuously opposed it. Finally the subjects under discussion were embodied in two resolutions as follows:

1st. "*Resolved*, That it is desirable that a system of sewerage for the borough be adopted," and 2d. "*Resolved*, That it is the sense of this meeting that it is desirable to provide an effective system of sewerage for the borough; that the plan proposed by Colonel Waring commends itself favorably, so far as the facts have been submitted, to this meeting, but that it is desirable that other plans be considered, and that therefore a committee be appointed who shall investigate the whole question and report to a subsequent meeting of the borough." Both of these resolutions were passed, and a committee of seven was appointed in pursuance of the second resolution.

The adjourned meeting was duly held and the following report submitted by the committee appointed by the preceding meeting.

REPORT OF COMMITTEE.

The committee appointed at the Special Borough Meeting, held November 12, 1880, respectfully report as follows:

The only matured plan for sewerage which has been submitted, is that of Col. Geo. E. Waring. The committee, however, has informally considered the other plans which seem possible of execution under the conditions obtaining in Stamford.

Under the old, or "storm water" system of sewerage, the sewers must be large enough, not only to carry the sewage, but also the surface or storm water of the streets, for which latter

STAMFORD

— CONNT —

PLAN OF PROPOSED SEWERS.

SCALE ABOUT 800 FEET = 1 INCH.

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purpose a far greater capacity is necessary than would be required for the carrying off of house sewage only. The far greater cost of a system of storm water sewers, which if extended to cover the whole area of the borough, would probably amount to from $200,000 to $300,000, seems to your committee to practically exclude this system from consideration. It is further excluded from present consideration by the unpaved condition of our streets.

Without discussing the ability of the borough to bear so heavy a financial burden, it can be safely stated that the voters of the borough would be almost unanimously opposed to the incurring of any such heavy expense. If this is so, obviously the only feasible way of providing sewerage is by the adoption of some plan by which the total cost thereof may be kept within a moderate limit, say not exceeding $100,000. The plan proposed by Col. Waring meets this requirement, and from the investigations thus far made, your committee knows of no plan essentially different from this, the cost of which would not be materially greater. Col. Waring's plan provides sewers of sufficient capacity, as he assures us, to effectually dispose of all house sewage, and extending to all parts of the borough. No system can do *less* than this, and therefore none can be less expensive, for there is nothing in Col. Waring's plan that is special or peculiar, other than the flush tanks, the cost of which is a small item. The resort to pumping which Col. Waring advises, your committee regards as unquestionably expedient to be adopted, if, as assured by many (including Col. Waring), some portions of the borough lie so low as to make it impossible to properly sewer them without it. Undoubtedly some portions of the borough can be sewered without pumping, and this should be done so far as possible in the carrying out of whatever plan may be adopted. There are other parts of the borough, however, which lie so low as to make it doubtful if they can be adequately and effectively sewered, without placing the sewers at such low levels as to necessitate pumping at some point in order to effect the discharge of the sewage in any safe and proper manner. The trifling cost of pumping would make this unobjectionable, if necessary, and the largeness with which it is resorted to, in other places, proves conclusively that it *is* feasible.

Your committee believes that it will probably be found desirable, in the carrying out of any system of sewerage, to lay a sewer of considerable capacity in or near the bed of the Mill River, from

Main street to the lower bridge, or perhaps still further south, in order to receive and carry off the waste products of the woolen mill and thus prevent the further pollution of the Mill River. The adoption of this plan will largely diminish the amount of sewage passing through the pumping station, not only by removing from the latter the large volume of impure water discharged from the woolen mill, but also by enabling some of the lateral sewers in the western part of the borough to be discharged into the proposed large sewer in the river bed. The arrangement and carrying out of this matter should, of course, be left to the consideration of whatever engineer may be employed for the final execution of the work. Adding an ample allowance to cover the cost of it to the amount of Col. Waring's estimate, the total cost of sewerage will still be found well within $100,000.

Your committee therefore would make the following recommendations, viz.:

1. That the necessary authority be obtained from the next General Assembly for the construction, by the board of Warden and Burgesses, or by such persons as the latter may empower, of an effective sewerage throughout the borough, provided that the cost thereof shall not exceed $100,000.

2. That authority be obtained also for the issuing by the borough of bonds, to an amount not exceeding $100,000, payable in not exceeding twenty years, to be issued in sums of from $25 to $1,000 each, and to be offered for thirty days to the citizens of the borough, the proceeds of said bonds to be applied only to defraying the cost of said sewerage; the question as to how much, if any, of the expense shall be defrayed by direct assessment being left for future consideration.

3. That a committee be appointed to present the proper memorial to the next General Assembly, and to secure the passing of the necessary legislation at the earliest practicable date.

Respectfully submitted,

William T. Minor,
Henry R. Towne,
Wm. W. Skiddy,
E. L. Scofield,
Committee.

* This report was accepted by the meeting and ordered on file. Subsequently, the following resolution was unanimously adopted:

Resolved, That a committee be appointed by this meeting to prepare and present to the next session of the General Assembly of this State a proper and suitable bill, authorizing and empowering the Warden and Burgesses of this borough to adopt and provide a general system of sewerage for said borough, subject to the approval of the freemen of said borough, at a cost not to exceed $100,000, and to issue bonds to an amount not exceeding said sum, in the name and on the faith of said borough, payable in installments, within not exceeding twenty years, to be issued in sums of from $25 to $1,000 each, and which when issued shall be offered for thirty days to the citizens of the borough. The proceeds of said bonds to be used in defraying the cost of said sewerage; and further empowering said Warden and Burgesses to appoint such person or persons as they may select, to have charge and control of the construction of said system of sewerage, and also to make and establish such rules and regulations for the proper use and management thereof as they may deem necessary and expedient.

The following resolution was also adopted:

Resolved, That a committee of three, to be named by the Warden, shall be appointed immediately, who shall report to this meeting, with as little delay as possible, the names of such persons, citizens of this borough, as in their judgment are best qualified to constitute the committee to draft a memorial and to present the same to the next General Assembly, as and for the purposes specified in the resolution previously adopted by this meeting.

On motion, the report of the committee appointed at the special meeting, held Nov. 12, was adopted.

The committee appointed to report names of suitable persons to draft bill to present to the General Assembly, reported the following names: Henry R. Towne, Julius C. Curtis, James H. Olmstead, E. L. Scofield, C. M. Holly, Thomas G. Ritch, and Wm. W. Skiddy.

On motion, the report was accepted.

On motion, the name of the Warden was added to said committee.

On motion, it was ordered that the names of said committee be inserted in the resolution adopted under which they were appointed.

On motion, meeting adjourned.

E. W. RIKER, *Borough Clerk.*

STAMFORD, Nov. 26, 1880.

The committee thus appointed duly prepared a draft of a bill in accordance with the terms of the resolution under which they

were appointed, and presented the same to the General Assembly at its last session. After some amendments, the bill was finally approved by the Joint Committee on Cities, and passed by both branches of the Assembly, finally becoming law by the addition of the signature of the Governor.

By this time, however, the season had so far advanced as to make it inexpedient to attempt anything further at that time. Even had public sentiment been ready for the commencement of the work, it would have been hazardous to have attempted it during the summer months, as the upturning of the streets and other digging involved would not only have been very inconvenient, but might have largely augmented the suffering from malarial poisoning. Work of this kind should, if possible, be prosecuted in cold weather, and in a town not larger than Stamford can by proper management be effected during the cool months of the fall and spring.

During the summer that followed, a new cause of disease and danger developed itself in the town. The Mill River, which forms the western limits of the borough, had originally been a clear and rapid stream, but had been changed by the construction of two dams—one near its mouth and the other a half mile higher up. At the latter point there is located a large woolen mill, which utilizes the water from the upper dam, occasionally for power, but chiefly for washing wool. The water thus used is discharged from the mill in a condition hard to describe. It carries with it a vast amount of grease and animal matter removed from the dirty wool, together with the alkalies and other chemical agents employed in the separation of the greasy impurities. Added to this are the waste dye-stuffs, acids, and other refuse products of manufacturing, the stream as it leaves the mill being dark and turbid, and offensive in every way. The deleterious matters thus carried down are deposited on the banks and shoals of the stream below the dam, and, with the alternate rise and fall of the water, are alternately exposed to the action of the sun and air, and then again covered with the polluted water.

In addition to this, the water in the upper dam, during the drought of the last summer, was for a long period constantly drawn down to so low a point (in order to supply the wants of the woolen mill) as to uncover the muddy flats which form the bottom of the upper pond, thus leaving the latter to the action of the sun during all the hot weather, and engendering a great amount of

malarial sickness and suffering in those portions of the town adjacent to the pond.

These evils have been so flagrant and so obvious to every one as to create an almost universal demand for their abatement, and in the desire for the removal of this more patent and immediate danger public opinion has been somewhat diverted from the question of sewerage. It is evident, however, that sentiment on this point is rapidly ripening, and that many are now awake to the urgent need of sewerage who a year ago were opposed, or at least indifferent, to it. Obviously, however, it is desirable that in effecting the proper sewerage of the town provision should be made for removing the present cause of the pollution of the Mill River, and for preventing any recurrence thereof. Unfortunately, the accomplishment of this project may involve a very large expenditure, additional to the cost of the sewerage system, and involves moreover (in order to effect it thoroughly) an enlargement of the limits of the borough beyond their present lines. The circumstances of the case thus compel a simultaneous consideration and treatment of three distinct matters, each of them of large importance, and two at least involving a large expenditure of money. Public sentiment has perhaps already ripened to the point at which it would accept the necessity for dealing with any one of these emergencies separately, but has hardly reached the point at which it is prepared to grapple with all three simultaneously. The agitation is proceeding, however, and the urgency is so great that it is hoped and believed that before long a plan will be devised and adopted whereby all of the dangers which now threaten the public health of Stamford may be permanently removed, and the town restored to its natural healthful condition.

It should be mentioned that a copious water supply was introduced some eight years ago, and that nearly all of the houses within the borough make use of this supply. The sewerage from houses is, without exception, discharged into leaching cess-pools. While vital statistics do not show a larger ratio of deaths in Stamford than in other towns, it is notorious that the so-called malarial diseases have enormously increased within its limits during the past decade, and statistics to corroborate this statement are not wanting. During the past summer and fall typhoid and intermittent fevers have been almost universal among the families residing around the banks of the upper pond, above referred to, and there also have been numerous cases of sickness in houses

adjacent to the river below the woolen mill, the water of which is polluted by the discharges from the mill.

Appended hereto is Colonel Waring's report and other papers relating to the agitation of the question of sewerage in Stamford, which, with the foregoing, make a complete presentation of the matter up to the present time.

Col. Waring's Report.

THE SEWERAGE OF STAMFORD.

Henry R. Towne,

Chairman of the Committee of Forty:

Dear Sir: Having gone carefully over the ground at Stamford, and having considered the same in connection with the controlling levels as shown by the "stereo-profile" of Mr. Fuertes, I beg to submit the following observations on the subject of sewerage to your borough.

OUTLET.

I see no way in which the outfall of your sewers can be delivered at any point in the harbor with even the probability that it will not become a nuisance to riparian owners, if not to those living some distance inland. The force of the prevailing winds and the action of the tides would doubtless combine, especially in the summer time, to prevent a complete outflow into the round, or even a complete deposit at the bottom of the channel.

I have considered carefully the comparative merits of the use of the salt marsh between the canal and the Shippan road as an osier bed, and the alternative plan of delivering at some distance below low water mark in Westcott's Cove.

I believe that the osier bed would be entirely satisfactory and that it would serve permanently as an efficient purifier of the sewerage. At the same time it seems hardly wise to adopt any means for agricultural disposal so near to what is likely to become a considerable centre of population, and over which even now many of the prevailing summer winds pass on their way to the thickly settled part of the borough.

To locate the osier bed at the other side of the Shippan road would make it too costly, as this would require a force main to be continued pretty nearly to the point of outlet in Westcott's Cove.

Westcott's Cove seems to me to be entirely unobjectionable as a point of delivery if the simple precaution is taken to discharge

the outflow well beyond the lowest low-water mark. I therefore decide upon that as being in all respects the most suitable.

PUMPING.

The slight elevation above tide of the area of most of the borough, makes it absolutely indispensable to the success of any system of sewerage that the outflow should be pumped to a considerable height. Not only must the discharge into the main outfall sewer begin at a sufficient height in a stand-pipe to secure the necessary fall—or what is equivalent to this, be forced by a corresponding pressure directly into the outfall sewer—but it is also necessary that a considerable artificial depth of outlet be provided at or near the center of population.

I therefore recommend the establishing, at a point near the present head of the navigable canal, of a pumping-well of considerable capacity and of sufficient depth to furnish a satisfactory outfall for a long line of sewer, beginning on South street, south of the New Haven railroad, running to the intersection of South and Atlantic streets, and thence to the canal. This will furnish a means of delivery for the sewerage of all that part of the borough lying south of the New Haven railroad and of the district between Mr. George A. Hoyt's house and the crest of Clark's Hill, north of the railroad.

In order to afford an equally effective means of outlet for the main part of the borough, I recommend that a sewer of considerable size and of low grade, be extended up Canal street, as far as the vicinity of the old basin behind Quintard's block.

This main can receive, in its course, the outlet of the sewers on Cottage, Atlantic, Willow and South streets, and their elevation south of Main street and the New Haven railroad. At its upper end it will receive one main sewer coming from Washington avenue, River street and the western part of Main street with its laterals, and others coming from Broad street, from the upper part of Atlantic street, and from the eastern part of Main strect with their laterals.

The general arrangement of the lines of sewers, so far as I have been able to determine them from the data in my possession, is shown by the accompanying sketch. It is quite likely that the accurate levels which must be taken at frequent intervals will show a necessity for modification iu the arrangement. These modifications, however, will not affect the total length of sewers to be laid; nor will they materially affect the estimate of the cost of the work.

LATERAL SEWERS.

I have sketched, in pencil, along the lines of the streets, as shown, the buildings laid down on the sectional atlas of Stamford, and I have been guided by these in determining the points to which lateral sewers should be extended. These laterals should be in all cases of 6-inch pipe with perfectly tight joints and should be laid, in most cases, at a depth of 5 to 7 feet, averaging rather less than more than 5 feet. They should continue of this size until they form an aggregate length of from 1,500 to 3,000 feet, according to their rate of inclination, and should then be increased to a diameter of 8 inches, and where several of them come together, as between the post-office and the head of the main sewer near the old basin of the canal, a somewhat larger size may be found necessary.

DETAILS.

The details of the work should be in all cases carried out in conformity to the work done in Memphis, which is described in the accompanying slip taken from an account of that work in the New York *Herald*, and outlined in a more general way in my paper on the subject, read before the American Public Health Association, in Nashville, November, 1879, of which a copy accompanies this report.

It will suffice for the preliminary consideration of the subject to rest the case on the description of the work contained in these two documents.

SUBSOIL DRAINAGE.

So far as my knowledge extends, there are few localities where artificial drainage at the depth of the sewers will be necessary. Should there exist places where the soil is retentive, it will be desirable to lay subsoil drains in the sewer trenches in the manner described in the report of the Memphis work.

I believe that the method of sewerage herein recommended is in all respects suited to the conditions to be met. There are no local obstacles to the complete carrying out of the work, and I am confident that the enforced connection of every house with these tight sewers, thoroughly ventilated by their connection pipes and by their fresh-air inlets, and thoroughly cleansed by the daily discharge of sufficient flush tanks, together with the enforced cleansing and filling of all the privy vaults and cesspools in the village, will secure an absolutely perfect sanitary condition.

It is sometimes assumed that the supply of pure water from an extraneous source, remote from the possibility of contamination, is all that is necessary for the sanitary improvcment of a village suffering from the effect of soil pollution. Certainly the abandonment of drinking-water wells, which are invariably polluted where they exist in close proximity to deposits of filth, is a very important sanitary measure; but there is another way in which. subterranean deposits of filth affect the health of the population most seriously, especially so in a gravelly soil like that of Stamford.

It is only recently that account has been taken of the condition of the contained air of the soil. The experiments of Pettinkofer and others have demonstrated the fact that the poisoning of this air by the infiltration of decomposing organic matter, has a most serious influence on the health of the population. You have yourself already called attention to the fact that, espccially in wintcr when the surface of the ground is frozen quite up to the foundation of the houses, the houses themselves have a direct action as chimneys for the drawing of this air from the soil. At other seasons of the year the direct escape into the atmosphere is as easy as is that into the cellars, but during winter therc can be no doubt that there is a very considerable constant fouling of the atmosphere of dwellings in the manner indicated. I would suggest further, that when heavy winter rains cause an elevation of thc soil-water—as they undoubtedly do in a large part of your village—the contained air of the soil, unable to escape through the frozen surface, is forcibly driven into spaces, which, like the cellars of houses, are protected from frost and afford an easy mcans for its escape.

Therefore, even though there may no longer be an unfavorable influence on the health of the people due to the contamination of their drinking water, there is no question that the atmosphere in which they pass most of the hours of the winter, is directly and seriously contaminated by organic impurities in the ground.

Here as elsewhere, there is no safety short of such radical improvement as will absolutely banish from within the limits of the borough every manner of foul organic accumulation whether in the ground or upon it.

So far as the experience of the world has gone, the only means by which this improvement can be secured, is by the construction of a complete system of sewerage which shall be free from deposit in all its parts and through which every particle of waste matter

shall be driven well beyond the inhabited area within a very few hours after its production, and before its decomposition has even begun.

I enter here into no argument against the construction of large storm water sewers, as that subject is sufficiently discussed in my Nashville paper, and as the mere fact of the far greater cost of such a system and the greatly increased difficulty of ultimate disposal which it entails seem to place it quite beyond your reach.

In other words, I believe that a perfect sanitary condition can be secured only by the adoption of the system herein recommended, and I believe that this system is the only one for which you would find it easy to provide the means. That your committee may be prepared to lay the subject before the people with all needed information concerning it, I append hereto an estimate of the cost of the work, which experience in similar soils leads me to consider a safe one. As many of your committee are much better qualified than I am to judge of the influence upon cost of the work of the boulders in the soil, I have based my estimate on the cost of construction in gravelly ground free from ledges or boulders of considerable size. This element must be added to the sum total.

ESTIMATE.

I estimate the total cost of executing the work, as laid down and described, to be as follows, no allowance being made for contractor's profit:

6,900 ft. 12 in. force main from the pump to the point of outlet @ $1.60 per foot, ...	$11,0400 0
2,200 ft. 18 in. pipe from the Canal basin south of Quintard's Block to the pump well, @ $1.20 per foot, ...	2,640.00
2,000 ft. 10 in. pipe sub-mains @ 90 cts. per foot, .	1,800.00
14,000 ft. 8 in. pipe @ 50 cents, ...	7,000.00
30,800 ft. 6 in. pipe @ 40 cents, ...	12,320.00
10 fresh air inlets @ $50, ...	500.00
48 flush tanks @ $25, ...	1,200.00
Royalty on same, ...	480.00
One 10,000 gallon flush tank at the head of the 18 inch sewer, ...	500.00
Royalty on same, ...	100.00
Pump-well, pump, boiler, house, etc., . . .	7,500.00

Making, ...	$45,080.00
Add for contingencies 10 per cent., ...	4,508.00
Making, ...	$49,588.00
Add for engineering 15 per cent., ...	7,438.00
Making grand total, ...	$57,026.00

The foregoing estimate does not include the cost of laying the house connection branches from the sewer to the line of private property. It *does* include the cost of the branch pieces by which these laterals are to be connected with the sewer, and as above stated, it does not include the additional cost of the work due to rock and boulders.

Very respectfully yours,

GEO. E. WARING, Jr.

Newport, R. I., October 9, 1880.

Some doubt having been expressed as to the efficiency of the sewerage system proposed by Col. Waring, to properly carry off the sewage of Stamford, I desire to make a few explanatory statements on this point. The velocity of the flow of water in pipes has been made the subject of exhaustive experimental research by Chezy, Eytelwein, Weisbach, and other eminent engineers, so that the laws which govern it are now perfectly understood. The amount of water which will flow through a pipe of given size, having a given inclination and a given length, is therefore not a matter of speculation or judgment, but an easily ascertainable fact. The most important factor in determining the flow of water which only partially fills its pipe or conduit is the extent of what is called the "wetted perimeter," that is, the portion of the pipe or sewer which is touched by the water. The greater the proportion of wetted perimeter to the volume of fluid to be discharged, the greater will be the resistance and the more sluggish the flow. It is on account of this fact that all large sewers now constructed are built with an egg-shaped or oval cross-section, the effect of which is to diminish the extent of the wetted surface and increase the depth of the water and the velocity of its flow. For the same reason, in great part, the tendency of the day is to use *very much smaller sewers* than heretofore, in order to give a more rapid flow and obtain the resulting scouring action. Under the old plan of large sewers the flow is so slow that the solid mat-

ters of the sewage have abundant opportunity to settle and deposit on the bottom of the sewer. This action continues frequently until the greater part of the sewer is filled with solid matter, and hence this system involves the necessity of frequent man-hole openings, through which an entrance can be obtained to the sewers for removing their solid contents by hand.

By the adoption of the smaller sewers proposed by Col. Waring, a much greater velocity of flow is obtained than would be possible with large sewers. The rapid motion of the sewage thus obtained acts to prevent the deposit of its solid constituents in the pipes and enables it to keep up a continually scouring action, which tends to always keep the pipes free.

Added to this is the daily flushing of every sewer by the automatic action of the flush-tanks, by means of which a large volume of water is constantly thrown into the upper end of every sewer, and which, rushing downward, carries with it and washes out any slight deposit which may have been formed. The amount of the solid constituents of sewage is usually very much over-estimated. As a matter of fact, the sewage of a town having a water-supply like ours is almost entirely water. This subject has been fully investigated by a government commission in England, with the result that the examination, by analysis, of the sewage of a large number of towns having a water supply, and in which water-closets were generally in use, being to show that the total solid matter amounts to but 72 parts in 100,000 parts of sewage, or, to state it differently, to 7-100 of one per cent. That is to say that, in 100,000 gallons of sewage, there was found but 72 gallons of solid matter. This statement is corroborated by the experience of any one who, in our gravelly soil, uses a leaching cesspool. Unless the walls of the cesspool become coated with kitchen grease and soap, so as to become partly impervious, the solid matter of the sewage will *disappear entirely* from the cesspool. In my own experience, I have used such a cesspool (into which no soap or grease passes) for several years, and was never able to obtain from it any thing but clear water, although it received all the discharge from two water-closets which were in constant use.

A certain *minimum* size is necessary in any drain pipe receiving water-closet waste, and experience has fixed this minimum at four inches diameter. We are so accustomed to using large drain-pipes that we are apt to underrate the carrying capacity of a six or eight-inch pipe laid with the average amount of inclination or

pitch. A six-inch sewer, having an inclination of one foot in 100, will discharge, when running full, 41 75-100 cubic feet per minute, which is equivalent to 313 gallons per minute, or 18,000 gallons per hour, or 432,000 gallons per 24 hours. It is thus seen that a six-inch pipe, having an inclination of one foot in 100, if running full all the time, is capable of carrying off the *entire sewage of Stamford,* with an ample margin to spare. The statistics of a large number of English towns and cities show that the average quantity of sewage discharged per day per head of population varies from 10 to 70 gallons, the latter being a very exceptional case. The average rate usually accepted by engineers is from 30 to 50 gallons per head. Assuming the average family to comprise eight individuals, the total sewage discharge from each house would average from 240 to 400 gallons per 24 hours. Now, as a six-inch pipe has a capacity, as above shown, of over 400,000 gallons every 24 hours, it is evident that a pretty large number of houses may safely depend upon a six-inch sewer for carrying off their sewage, particularly as the discharge from each house is variable and intermittent, so that it seldom happens that there is a large discharge occurring simultaneously from all the houses on any one sewer.

I trust the foregoing has made clear that, even with the sizes of pipes proposed, the plan of sewerage recommended by Col. Waring has a capacity far in excess of any possible requirements of this town. *Small sewers are better than large ones* because, by reason of their smaller capacity, the amount of decomposing matter within them is reduced to a minimum, and the amount of noxious gases generated by its decomposition thus proportionately decreased. A large sewer, on the other hand, contains a large amount of organic matter suspended in a sluggishly-moving stream of water, and in contact with a large volume of contained air, thus presenting every condition favorable to decomposition and the rapid generation of noxious gases. It is, in fact, a huge retort or generator for the production of sewer gas, which latter, by means of the house connections, may be said to be "on tap" in every house connected with it.

The system which Col. Waring advocates, and which is no longer experimental, but demonstrated by experience to be perfectly adequate and reliable, provides for sewers of sufficient capacity to carry away at all times the maximum amount of sewage which can be poured into them, but which are so constructed

as to ensure at all times a rapid and self-cleansing flow throughout their length, supplemented by a daily flushing of such character as to thoroughly scour and wash out the whole sewer from beginning to end. As a result, the excrement, grease, and solid filth of all kinds which enter the sewers are carried on and removed so rapidly and frequently that they remain in the sewers a few hours, at the longest, and are discharged before decomposition takes place.

Reflection will convince any one that this is the ideal result to be attained in any system of sewerage. Under no previous system has it been even approximately attained.

"The art of sanitary drainage may almost be said to have been born—or reborn—but a quarter of a century ago. Indeed, it is only within the past ten years that it has made its way in any important degree outside of purely professional literature." * * "Happily, men, and women, too, are fast coming to realize that humanity is responsible for much of its own sickness and premature death, and it is no longer necessary to offer an apology for presenting to public consideration a subject in which, more than in any other—that is, the subject of its own healthfulness and the cleanliness of its own living—the general public is vitally interested."

We have long been accustomed to think of the air as being all *above ground*, but in this we have been gravely in error. *The ground is porous, and it interstices are filled with air.* This "ground-air" *moves* under the influence of wind pressure, differences in temperature and elevation, and other causes, so that poisonous emanations absorbed by it in one locality, as, for example, in the vicinity of a cess-pool or privy-vault, may be carried by it to another locality, as, for instance, the basement of a dwelling, and there be mingled with the air we breathe.

On this subject Prof. Hartley of London, says: "It has been shown that the bulk of a gravelly soil consists of one-third air; that is, the space between the stones and particles of sand which is filled with air amounts to one-half the space filled by the gravel. Let us now consider this soil to be the surroundings of a house, and imagine a drain leaking into such soil; the ground-air would be charged with the products of decomposing offensive matter, and those abominations which are to be so much dreaded as the cause of zymotic diseases, [*i.e.*, typhus and scarlet fevers, diphtheria, malarial fever, etc.] The house built upon this soil is full of

warm air, and up the chimneys a draught rushes causing, when the doors and windows are closed in the lowest rooms, a certain amount of the ground-air to enter by way of the floor, carrying with it the germs of disease and perhaps death."

Now, what are the conditions in Stamford? We have a very open, gravelly soil. We have a copious artificial water supply, nearly all of which, probably 200,000 to 300,000 gallons per twenty-four hours, is discharged through our numberless cess-pools and drains into the soil, carrying with it the kitchen slops, grease, human excrement and other filth from nearly every habitation within our limits. This enormous volume of filthy, putrescent, decomposing vegetable and animal matter we are daily spreading farther and wider in through our porous soil, and thus bringing it more and more widely into contact with the ground-air in that soil, which air also surrounds and inevitably enters our dwellings. If it was our deliberate purpose to ruin the town by undermining the health of its inhabitants we could employ no more certain, effective, and irresistible agency than that we now have. The truth of this statement is evidenced by the experience of scores of towns and villages, here and in Europe, in which the inhabitants, after introducing an artificial water supply, have sought to utilize the soil beneath them for the disposal of their sewage, in order to avoid the expense of sewerage, and have been forcibly compelled to accept one of the three inevitable alternatives, viz.: (1) the abandonment of the artificial water supply; or, (2) the removal of filth by sewerage; or, (3) the pusillanimous acceptance of general ill-health and high death-rate. The vital statistics of twelve English towns, of populations ranging from 8,000 to 60,000, show the following reductions in mortality *after* the introduction of sewerage, as compared with the death-rates in the same towns *before* they were sewered, viz.: reduction of total death-rate, 16 per cent; reduction in deaths from consumption, 30 per cent: reduction in deaths from typhoid fever, 47$\frac{2}{3}$ per cent. A defective system of sewerage may be more harm than good, but in the face of *facts* such as these, who can argue against the desirability of a *well-designed* and *well-executed* system of sewerage?

The Borough of Stamford has, naturally, one of the healthiest possible sites. We have abused our opportunities, however, and have made that which should be a blessing, our open, gravelly soil, a curse and menace to health and life. Our shortsightedness in this has become noised about, and Stamford has become

associated with ideas of bad drainage, malaria, and general unhealthfulness. Whether well-founded or not, these reports have given Stamford a bad name, have retarded building within its limits, and have turned away strangers who have come here to look for homes. *Proofs* of these facts will be given to any who doubt the foregoing statement. In addition, therefore, to the incentive for action afforded by the desire we all have for health and long life, is the interest of property owners in the preservation of the value of their property. Beyond all doubt the value of property here is *depressed* by the facts above stated, and will be greatly *enhanced* by the completion of an efficient system of sewerage.

With the *data* thus obtained, report shows that there are no obstacles to the establishing of a perfect system of sewerage in Stamford, and that the cost of the work will be much less than has heretofore been supposed. This latter fact is largely due to the adoption of "the flush tank system," invented by Col. Waring, and now in daily and successful operation in many towns, including all of those above named. This system consists in providing, at the head or starting point of each line of sewer, a "Field's flush tank," which is a small cistern, built entirely under ground, and containing a few barrels full of water. The water required is of trifling amount, and is obtained from the street mains by a simple automatic valve in each flush-tank. By an equally simple and automatic device the entire contents of each tank is suddenly dumped, once or twice every twenty-four hours, into the sewer, and rushing through the latter, *scours it thoroughly*, and carries out of it every particle of filth. The frequency of these "flushings" insures the removal of all organic matter from every sewer in a comparatively fresh condition, and *before decomposition has commenced.* All accumulations of filth thus being guarded against, and no surface or storm waters being admitted, the size of the sewers can be greatly reduced. Experience shows that a six inch pipe is amply large enough for the first 2,000 or 3,000 feet of a line of sewer when thus frequently "flushed," and hence the great economy in cost of this system. The proposed plan of sewerage involves some 49,000 feet ($9\frac{1}{4}$ miles) of sewers within the Borough, of which 63 per cent. (30,800 feet) will be 6 inch pipe, the remainder being 8, 10, and 18 inch pipes. In addition will be required 6,900 feet ($1\frac{1}{3}$ miles) of 12 inch force main for delivering the sewage from the pumping station to the point of discharge in the Sound.

With the adoption of the pumping system, all difficulties in the sewering of Stamford disappear. Without it, it is impossible to properly sewer the town. The cost of the pumping apparatus is included in the estimate, as is also the cost of a suitable covered collecting reservoir or sump. The cost of pumping will not exceed $2.50 per day, everything included, and will *probably* be less. The work required only equals that of four horse-power steam engine, assuming the daily flow of sewage to be as high as 300,000 gallons.

Col. Waring's calculation of the total cost of the system aggregates $57,000, not including any allowance for blasting nor for profit to the contractor. Adding a liberal margin for these and other contingencies, $75,000 may be safely assumed as a sum which will cover the entire cost of the work, complete and ready for use. If this entire amount were assessed at once upon the owners of property in front of which the sewers would pass, the the charge would be *only* 77 *cents per foot of frontage!*

Assuming, however, that bonds are issued for the whole amount, the annual charge will be as follows, viz.:

Interest on $75,000 at 5 per cent	$3,750.00
Cost of pumping, at $2.50 per day	913.00
Total	$4,663.00

This latter sum is the equivalent of $13 *per day as the entire expense to this Borough of a thorough system of sewerage.* Can there be any doubt of our ability to bear this insignificant burden? The present Grand List of the Borough is $3,477,497, so that the entire first cost of sewerage is *only* 2 15-100 *per cent. on the assessed value of property within the Borough.* If bonding is resorted to and the *annual* charges amount to $4,663 as above stated, an additional tax of $1\frac{1}{3}$ mills on the dollar will pay them. Our present Borough tax is at the rate of $2\frac{3}{4}$ mills (an exceedingly low rate, so that we are in good condition to bear the slight increase required), and our other taxes, town, state, and school, 11 mills. Adding the extra amount required to cover annual expenses of sewage ($1\frac{1}{3}$ mills) would make our total taxes only 15 mills on the dollar, or $1\frac{1}{2}$ per cent. on a low valuation, a rate much below the average. The *increase* in rate of total taxation would be only 10 *per cent.* more than what we now pay, a sum much less, probably, than what we now expend in vainly trying to clean out our old cess-pools and in sinking new ones.

One of the most important questions in connection with the proposed arrangements for providing sewerage in Stamford, is that which concerns the mode of paying for the work.

This question has been very fully discussed at the meetings of the committee appointed to consider the whole question of sewerage, and also at the earlier meetings of the committee at whose instance Col. Waring's survey, plan, and estimate were prepared. As I before stated, the entire first cost of the proposed system of sewerage would be met by an assessment of *77 cents per foot* of frontage on the property abutting on the streets through which the sewers passed. This mode, however, would undoubtedly be onerous to some persons, and unjust to a great many, for the reason that the distribution of the burden would be based wholly upon the *frontage* of property and not upon its value. A fairer way, therefore, would be to base the assessment upon *property valuations*, in the same manner as our taxes are now proportioned. Many objections have been made to this, however, including the very pertinent one that it would put a severe burden upon many of the smaller property owners, and one which they could not well meet.

My own judgment in the matter is that the interests of all will be best served, and the burden be most equally distributed, by defraying the cost of sewerage by an issue of bonds, *with provision for the retirement of such bonds within a period of say twenty years.* Assuming that bonds to an amount of even $100,000 are issued, the payment of them within twenty years would be amply provided for by an additional tax-levy of 1½ mills in each year, based on the present grand list. That is, a person whose property is assessed at $1,000 would be taxed $1.50 per annum, on account of the sinking fund for paying off the bonds, and this small tax would in twenty years pay off the whole debt. As, however, the growth and development of the town will undoubtedly result hereafter, as in the past, in an increase of our grand list, the burden of this very slight extra taxation will be distributed over a constantly increasing number of taxpayers, and be based upon a constantly increasing grand list. In this way the expense of an improvement which is to be permanent, and for the benefit of the citizens for generations to come, will be spread over a period of twenty years, and be borne partly by the community as at present constituted, but partly also by those who become members of it during the period referred to.

Our present taxes here are light, so that we are in excellent condition to assume the moderate and temporary burden involved in providing ourselves with sewerage. Even with this added taxation our total taxes here will be only of average amount, and considerably smaller than in many other places I could name. The adoption of the plan above outlined will give us prompt and effective sewerage, and will provide for the paying off of the debt created therefor within reasonable time, leaving us afterwards with a complete system of sewers entirely paid for and belonging to the Borough, and involving no further expense except the slight repairs and supervision required to keep them in good working order.

In issuing the bonds it is proposed to offer them first in small amounts to the citizens of the Borough, so that all who wish them as a means of investment may obtain them. If any are untaken in this way they would then be offered to the banks.

It is believed that this plan will commend itself to the intelligence and favorable consideration of the community. It distributes and equalizes the burden in the fairest possible way, and provides for the definite paying off of the indebtedness in a manner so easy as to make it hardly felt in our taxation.

To say nothing of the benefits resulting to the community in health and in the increased value of property, I believe that the cost of the work as above distributed will, in the average constitute a burden but little greater than our present annual expenditures for the cleaning out of our present cess-pools and drains, and the construction of the new ones which are made necessary by the fouling and choking up of old ones. The financial question has apparently been always the main difficulty in regard to the introduction of sewerage. Under the plan above outlined this difficulty disappears, and there no longer remains any obstacle to the immediate and effective sewering of the Borough.

SECRETARY'S REPORT.

The past year has been one marked by increased activity and labor in nearly all of the departments that come under our charge. The ordinary correspondence has increased threefold this year, and there have been more than the usual number of special investigations. The increase in personal interviews and consultations on sanitary subjects is an important feature; also the correspondence with local authorities in relation to small-pox. The malaria investigation shows for itself the time and labor involved. The microscopical work in relation to trichinæ has been mentioned before. Examinations of the healthfulness of well-water and from other sources used for drinking have been frequent, more so than in both of the former years combined. In procuring a specimen from a well for examination, if possible a quantity should be dipped from near the surface, one from the middle, and another quantity from the deepest portion of the well, and either equal parts of all three mixed and sent, or else a specimen of each. Curious results have often resulted from the neglect of this precaution. Thus, by accident, a sample of water from near the surface of a well was sent one chemist. He reported it as utterly unfit to drink and loaded with organic impurities; a worse specimen he had scarce ever encountered. To the second chemist, a portion from the bottom of the well was sent. After examination, he reported that it was the purest specimen he had encountered for some time, entirely free from organic impurities, or very nearly free, and no excess of mineral compounds. As can readily be imagined, great discredit was thrown upon both and upon their science, and the whole matter was declared to be unreliable. Yet each chemist was right, and in this case, fortunately, it was so proved; for a third took specimens personally, and, as his results agreed with neither, made another examination, and found three layers in the well. At the bottom there welled up a very cold, pure spring, and from the surface drainage, warmer and therefore

lighter water, thoroughly charged with a solution of the surface filth adjacent and of that in the soil, remained at the top, while there was a middle layer formed by the diffusion of the two. Of course, if there had been a fixed quantity in the well, and none added nor removed, in process of time the water would have become all alike by diffusion; but as it was all the while running in at the top and also coming in from the spring the same conditions were preserved. So, in examining the water from a river, the air should be allowed to escape under the surface of the water, but not near enough the bottom to stir up the mud, not, as is generally the case, taking it from the surface only, and thus obtaining a larger proportion of any light floating objects and less of the organic and mineral impurities.

The increased demand for the publications of the Board has already been alluded to in the general report. But exclusive of the annual reports, the demand for the sanitary pamphlets of the Board has increased during the year more than threefold. This is one of the most important of any of the undertakings of the Board, the dissemination of plain, practical facts about disease and its prevention and how to manage in threatened danger. We are adding to our stock, year by year, such treatises as fast as circumstances will allow. An enumeration of those relating to sanitary science will not be out of place, as most of them are in stock and can be had when called for. If the importance of the subject warrants it, upon the exhaustion of one edition another is issued, with any improvements that experience has suggested. Thus there have been three editions of the pamphlet on the Prevention of Diphtheria.

1. On the General Nature and Scope of Public Hygiene.
2. On the Treatment of the Drowned.
3. On Public Hygiene, its Claims and Results, by Dr. J. S. Butler.
4. On the Prevention of Diphtheria.
5. On Rural Hygiene.
6. Suggestions on Disinfection.
7. The Restriction and Prevention of Typhoid Fever.
8. The Relation of Modern Health Boards to Material Prosperity and Wealth, by Prof. Brewer.
9. The Restriction and Prevention of Small-Pox.
10. The Disposal of Sewage, by Prof. Lindsley.

Copies of these are given for free distribution to responsible parties and sent wherever likely to be read and to be useful through any special interest in the subjects upon which they treat, caused, for instance, by the unusual prevalence of the disease they describe. The large number of questions called out by their perusal from parties to whom they have been sent proves conclusively that they have been read and thought over. Thus, from the authorities of a majority of the places where small-pox has appeared, special instructions as to their powers and duties have been received, the pamphlet issued showing how to manage for individuals and families. In like manner, questions relating to the house and its surroundings have been received from those to whom the paper on Rural Hygiene was sent.

In quite a number of instances we have given prompt and much needed information as to just where and how a supply of pure vaccine virus could be immediately procured, a matter of great importance where the work is to be done with authority as well as generally, as shown by Prof. Lindsley's paper. In cases of emergency we have forwarded supplies in response to telegrams, and thus aided in getting ahead of the dread disease. The importance and value of a central sanitary bureau has been repeatedly demonstrated this year and the spread of pestilence averted. The following letter illustrates this supply out of several similar.

NOVEMBER 6, 1881.

C. W. CHAMBERLIN, M.D.:

MY DEAR SIR,—I thank you for the prompt and satisfactory response to my telegram of Saturday P. M. I ventured to send a second message this P. M., not knowing to whom else I might send, as I am not informed whether any agency for the sale of vaccine exists in Hartford.

We have a case of confluent variola, occurring in a child of four years, whose parents reside in the center of our village. Contrary to orders, the father "exposed" several of our people, hence the panic which generally arises in a country town on the occurrence of such a case is in this instance greatly intensified.

Indeed, under existing circumstances it seems desirable that certain people should be promptly and thoroughly vaccinated, hence my telegrams.

Please give me definite information where and of whom vaccine may be procured; at what cost (if in quantity or otherwise), and

whether the supply would equal the demand if we make, in accordance with the direction of our "Board of Health," a thorough and systematic vaccination of the community, and should order by telegram. I trust if convenient you will promptly enlighten me.

I shall be very glad to receive vaccine to-morrow, as early in the day as possible.

It is gratifying to learn that Meriden has completed a pest-house under the general plan of this Board, and that others are likely to follow suit. There should be a van connected with the pest-house to carry patients thither, so that vehicles in common use need not be infected; also to transport articles to the disinfecting house connected with the pest-house, if there be one, as there should.

There is one point that might as well be mentioned here, and that is, the need of some legal restrictions upon the transportation of the bodies of persons that have died of malignant contagious diseases. So far as I can learn, there is no direct provision upon this subject. The question has been asked by registrars whether they have the right to refuse permits in such cases. There appears no law authorizing them to refuse permits, the only provision on the subject is that in relation to the refusal of permits for disinterments in certain months of the year of bodies that have been once buried is forbidden. Railroad officials have made the same inquiries whether they are under any legal penalty in carrying the body of a person that has died of malignant contagious disease. Probably the force of public sentiment would prevent any one issuing a permit in case of a person dying from small-pox, nor would any railroad probably receive such a body. But the bodies of persons that have died from almost every other malignant disease are transported more or less freely. I learned of one case where a child died from diphtheria; the body was removed, and the coffin opened when funeral services were held at the place of destination. This gave rise to several other cases and introduced the disease in a new place, before free. There should be a law forbidding the transportation of such bodies unless thoroughly disinfected. The bottom of the coffin may be packed with sawdust moistened with a disinfectant, and the body wrapped in a sheet wet with the sulphate of zinc and salt solution,* which is an efficient and cheap

* Sulphate zinc 4 ounces, common salt 2 ounces, to a gallon of water.

disinfectant, much more efficacious than carbolic acid, which in ordinary solutions is worthless, and having another advantage in that it is cheaper and inodorous.

Some provisions should also be made regarding the transportation in public vehicles of persons having malignant contagious diseases, in order to protect the public health. Of course, in the absence of any vehicle for the express purpose, it might be difficult to secure necessary transportation in some cases, so that while it may not be advisable to absolutely forbid the transportation of such persons, it should be required of the owner of the carriage that he disinfect it thoroughly after such use. Some provision with regard to public funerals in case of death from malignant contagious disease should be incorporated in the laws, or if too early for that, public attention cannot be too often called to the matter. It is surely no want of regard or respect for the dead to prevent any contact with the infected body or emanations from it, carrying sickness and death to friends and neighbors or attendants from scattering contagion over wide areas. Public funerals in such cases should be discountenanced in every possible manner.

It is to be hoped that the increased number of the report to be issued this year will fully meet the demand at least in this State. Of our last year's report more than twice the number issued could have been properly distributed. Had it not been for the (as it proved) wise action of the Board in ordering at its own expense several hundred extra copies, we should have been unable to have supplied half the professional men, public libraries, and similar calls, which must now go unheeded, although coming in almost every day. The only reserve we now have is to supply each new State as it wheels into line. It is with extreme regret that we are obliged to state ourselves unable to supply a legitimate demand. Of course our own State has had the preference. The last copy sent was after repeated calls to the State Agricultural College at Lincoln, Nebraska, the statement having been added that the person wishing the copy was lecturer on State hygiene and sanitary science. The establishment of several such professorships at different institutions in the country is a very encouraging feature. There is need of good, plain, elementary text-books for use in our schools. At least some aspects of the question could be presented in a plain, practical manner, even if it were impossible to give anything like a connected view of the comprehensive whole included under the

term Public Hygiene. That there must be so much elementary knowledge on so many branches presupposed is one almost insuperable obstacle to anything like a satisfactory solution of this problem. Every method and plan that aids in educating the people in the prevention of disease and prolonging life is certainly to be commended.

STATE BOARDS OF HEALTH.

There have been so many inquiries relative to the States that have such organizations and the date of their construction, that I have compiled the following table which shows the date of each one. Their powers vary, and also the fields they cover. For instance, that of Louisiana was first created in 1855, as a Quarrantine Board for the State, and in 1870, reconstructed and given in addition all the usual powers of State Boards; that of Rhode Island, has also the contagious diseases of animals to look out for and prevent. Many minor differences exist, but on the whole they are planned alike. I have not yet learned the composition of the Arkansas Board.

As seen by the table, Massachusetts inaugurated the movement. The subject was first set afloat in 1850, when a committee was appointed to make a sanitary survey of the State. Their report is one of the earliest State papers on public hygiene, and is valuable for all time. The reports of the Board form a valuable sanitary library in themselves, and are contributions to the literature of State Hygiene that will be of permanent value. The facts recorded have been the basis for much work by other hands. Under the lead of the lamented Derby, their talented and enthusiastic secretary, they did much to popularize and extend the knowledge of the principles of sanitary science. Dr. Logan, the energetic organizer of the California State Board of Health, is also dead, and, I think, the first secretaries of the Louisiana and Virginia Boards. Commencing with Minnesota, there have been no changes in the secretaries since the Boards were organized, with possibly one exception. The reports of the various Boards are all of exceeding value and interest. Those of Michigan are more extended and cover a wider range perhaps than most. With several clerks at their disposal all the while, enterprises can be undertaken forbidden to others less favored. The wise generosity of the State has been amply repaid in the services returned. Alabama has recently shown a marked increase of activity in this line. Most

publish reports every year, several once in two years. The earlier reports of the older Boards bring a high premium and are obtained with extreme difficulty. The presentation to our own Board of the Massachusetts reports from the first to the ninth inclusive by our President, Dr. Butler, was of great value, as it is almost impossible to obtain a complete set now.

The following is a list of the State Boards of Health, now in existence, with the names and address of their secretaries and date of organization:

STATES.	When organized. DATE.	SECRETARIES.
Massachusetts,	1869,	H. P. Walcott, Boston.
California,	1870,	F. W. Hatch, M.D., Sacramento.
Louisiana,	1870,	S. S. Herrick, M.D., New Orleans.
Virginia,	1871,	S. S. Joynes, M.D., Richmond.
Dist. of Columbia,	1871,	Smith Townshend, M.D., Washington.
Minnesota,	1872,	C. N. Hewitt, M.D., Red Wing.
Michigan,	1873,	Henry B. Baker, M.D., Lansing.
Maryland,	1874,	C. W. Chancellor, M.D., Baltimore.
Georgia,	1875,	V. H. Taliaferro, M.D., Atlanta.
Alabama,	1875,	T. A. Means, M.D., Montgomery.
Wisconsin,	1876,	J. T. Reeve, M.D., Appleton.
Colorado,	1876,	F. J. Bancroft, M.D., Denver.
Illinois,	1877,	John H. Rauch, M.D., Chicago.
Mississippi,	1877,	Wirt Johnson, M.D., Jackson.
New Jersey,	1877,	E. M. Hunt, M.D., Metchuen.
North Carolina,	1877,	Thomas F. Wood. M.D., Wilmington.
Tennessee,	1877,	W. M. Clark, M.D., Nashville.
Connecticut,	1878,	C. W. Chamberlain, M.D., Hartford.
Kentucky,	1878,	N. J. Sawyer, M.D., Frankfort.
Rhode Island,	1878,	Charles H. Fisher, M.D., Providence.
South Carolina,	1879,	H. D. Fraser, M.D.. Charlestown.
Delaware,	1879,	William Marshal, M.D., Milford.
West Virginia,	1879,	J. E. Reeves, M.D., Wheeling.
Iowa,	1880,	S. F. Andrews, Des Moines.
New York,	1880,	Elisha Harris, M.D., New York.
Arkansas,	1880,	
Indiana,	1881,	T. M. Stevens, M.D., Indianapolis.
New Hampshire,	1881,	J. A. Watson, M.D., Concord.

Twenty-seven states now have State Boards of Health. The District of Columbia has a similar organization, but is not included

in the twenty-seven. Active movements are being made in other States, which will in all probability swell the list rapidly. New York and Massachusetts remunerate most liberally, although other States have shown an increased regard for the claims of sanitary science and State hygeine, and of the practical value to the State, of the results achieved. The work is extensive enough in any State to demand the whole time and thought of at least one man, still this claim is more slowly responded to; but one by one the States are recognizing this fact and acting upon it.

MALARIA.

The study of the recent outbreak of malaria in this State can be regarded only as preliminary, but before any definite conclusions can be drawn, the facts must be carefully collated and recorded for future use. The field has been thoroughly investigated, a large portion of it personally, but preference in the local histories has been given to those that have so kindly and fully answered the inquiries. The paper of Gen. Viele treats of the subject in a more comprehensive manner, and he has furnished a valuable contribution to the literature of the subject. The relation of Westchester County, New York, as a breeder of malarial germs for Southwestern New England as shown, is very interesting and very valuable, considering that Gen. Viele has constructed a topographical map of that county, and is, therefore, fully acquainted with its characteristics. The drainage map illustrates both papers and will be an invaluable aid for all future studies of the Board of local diseases, as influenced by drainage areas. We have felt the need of such a map wofully in previous investigations, and a long felt want is thus supplied. A few extra copies will be provided for the use of the Board in future studies, and upon this general ground-work, the minor systems affecting smaller areas can be built up.

In only a half dozen instances, in the whole area covered, was there a persistent negligence in replying to my circular, and subsequent letters of inquiry. Seventy five in a hundred replied promptly, without repeated solicitation, and of the remainder, nearly all replied to a second request, in only a few was a third letter necessary, and as stated above only six refused wholly or neglected to answer. In some places where information could not be obtained from physicians, some intelligent citizen could usually

give nearly as correct an account, for the types and phases of malaria are now pretty much as well known by the people as by the physicians. The following is the list of questions sent out.

1. Date of first cases that originated in this town, as nearly as known.
2. Nature of the first cases, intermittent, typho-malarial, etc.
3. Locality of first cases in relation to,
   a, altitude, on high or low ground,
   b, vicinity of marshes, ponds, or streams,
   c, any other probable cause which please describe.
4. Have there been cases of
   a, regular intermittent,
   b, tertian ague,
   c, congestive chills,
   d, typho-malarial fever,
   e, enlarged spleen;
   f, mention other forms.
   Which are most prevalent?
   Which have proved fatal?
5. Are malarial diseases now increasing, diminishing, or stationary?
6. Had there been any unusual disturbance of land, or obstruction to natural drainage by dams, or embankments previous to the appearance of malaria, and likely to cause it? Describe any conditions which were likely to cause malaria.
7. Is there any local cause that has apparently influenced its location or persistence in any special portion of the town? If so please describe.
8. Nature of flooded lands, if any, and of the streams obstructed, whether rapid or sluggish. Average depth of water in ponds; is bed or any part exposed or offensive during any part of the day? How long before the appearance of malaria were the dams built? Have they been raised recently?
9. Has the presence of malarial diseases influenced the frequency of typhoid fever or consumption?
10. How extensively have malarial diseases prevailed, and what ages are affected?

Please answer the above questions as fully as convenient. Any other facts concerning the appearance and spread of malarial diseases will be gratefully received. It is desirable to secure as full a history of the present manifestation as possible even if no light be thrown upon its causation.

The first special investigation that engaged our attention exclusive of those relating to small-pox, the salient features of which are given in the general report, and hardly need repetition, was in reference to the sanitary drainage of New Milford.

The following letter of invitation was received early in May, and a visit of inspection made, and the report follows:

NEW MILFORD, CONN., May 11, 1881.

DR. C. W. CHAMBERLAIN, HARTFORD, CONN.:

Dear Sir:—The selectmen of this town have called a town meeting for next Saturday P. M., the 14th inst., to consider the subject of the village sewerage, and to make an appropriation for necessary improvements and extensions. What exists now is inadequate and incomplete, and we wish to work intelligently and with a view to permanence. To this end I have been requested by the authorities to inquire of you what assistance, if any, we can gain from the State Board of Health. Can a representative of your Board come here to examine the situation and give us scientific and practical advice? If so, can he come this week, and, after necessary investigation, give any desired information at the meeting on Saturday P. M? This could be accomplished by his coming here Friday P. M., and staying till Saturday P. M. But if not then, how soon after could he come, and confer with a committee?

If a member of the Board cannot come, please inform me how we can get the desired information and assistance. Yours truly,

T. DWIGHT MERWIN.

In response to this invitation an investigation was made and a plan for sewerage and drainage advised, which was carried out as illustrated by the map and following report. The drain in Main street had been laid some time.

SANITARY DRAINAGE OF NEW MILFORD.

New Milford is a beautiful town situated in the upper valley of the Housatonic, amidst very picturesque scenery. It has long enjoyed a deserved reputation as very healthful, the principal endemic disease being typhoid fever, although that was never very prevalent. The usual unsanitary conditions incident to village life were found here, although in a less marked degree than in many places not as favorably situated. Naturally, as in all villages, and, indeed, in many cities, the principal sanitary evil was found in the too prevalent habit of storing up domestic filth about the dwellings by privy-vaults and cess-pools, instead of securing its prompt removal, and its utilization by the rootlets of plants, which, after all, are nature's great alchemists, and can, and do, transform death to life, and the sources of disease and death, to health and life-giving sustenance. In early years, before long occupancy had contaminated the soil, so that the water gathered from it was yet unpolluted by filth and the germs of disease, the resultants of such conditions in malignant-contagious diseases was comparatively unknown. The addition of an adequate supply of pure drinking water from a beautiful lake high in the hills, whose water-shed is uncultivated forest-land for the most part, while it removed this element of danger from those that used the public water supply, increased the soil saturation by the large quantities of water introduced, which had no other outlet than the natural drainage of the soil.

Whether there was any relation here of cause and effect is, of course, not certain, but not long after malarial diseases appeared, and, as in many hill towns, in the form of typho-malarial fever, at the outset, the first case in 1879. Malarial diseases have prevailed here more or less ever since the original type, being the most prevalent form.

There has been no marked increase in the sickness rate of the town, except relatively, as in other towns, during the last two years, which have not been as healthy as the average. There has been no general prevalence of intermittent fever, or diseases of that type; dumb-ague and malarial neuralgias have been met in some cases, and the general periodic influence felt by all diseases. There has been not a case of congestive chills, and nothing like chronic malarial poisoning. The mongrel malarial fever, with a

DRAINAGE
PLAN
of
NEW MILFORD,
CONN.
Scale:
0 40 80 120 160 320 480 feet
Heavy black lines indicate Sewers.
Red lines indicate water Service.
Am. Photo Lith. Co. N.Y.
HOUSATONIC RIVER
TERRACE PLACE
BENNET STREET
MAIN STREET
RAILROAD ST
BANK ST
WHITTLESY AVENUE
EAST STREET
CHURCH ST
BRIDGE ST
SOUTH MAIN STREET
WEST STREET
Housatonic RR

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long period of malaisé prostration and continued fever, with no marked chill or sweating, has been more common. Of late all forms have been less frequent.

As there were well-known sanitary evils that deserved attention, it was thought a good time to devise some general plan that would remove the worst at one sweep. If the conditions favorable to malaria could be reduced to their minimum, at the same time there could, of course, be no objection. There were several levels, with extensive table lands above, with no adequate sewerage or drainage, and abrupt precipitous banks between in some places, in others, steep pitches, or again, long slopes. Where there were successive houses on these ranges at different levels the drainage evils were at their maximum. There were one or two morasses where drainage had been carried to a depressed swamp hole with no exit except the overflow, but these were few.

Some nine years since several public-spirited citizens had subscribed nine thousand dollars or so, and constructed a large drain to carry off the surface and storm water, which flooded the main street, especially in spring and autumn, and generally after heavy rains, and rendered traveling very unpleasant. This is shown on the map by a heavy line running through the center of the street. The light-red lines show water service, and the hydrants are also marked. There is force enough at the hydrants to throw the water through a hose over the highest buildings, thus furnishing a perfect fire service. This main street is really the public square, wider at the lower end, and, of course, not square in shape, but it serves that purpose. The houses on the upper side stand on higher ground than the street, and in front of the offset wall is a broad lawn, then the street, and then again, a level lawn of varying width on the other side, of which the street runs parallel with the one first named, with another wide stretch of lawn before the houses are reached. There are large shade trees, of elm for the most part, which, with its more open habit, is the best adapted for a shade tree, as it does not exclude all sunlight from the ground while excluding the glare. This makes a very beautiful street or square. Around the sides are comfortable homes, churches, and other public buildings, including the town hall, a fine edifice of pressed brick, the hotel, and some stores, although the most of the latter are upon cross-streets leading towards the river. The drain empties into the brook, and at first received nothing but drainage proper, but later the wash from sinks and wash-basins was allowed

to enter. But it never becomes offensive; it is well ventilated and receiving no sewage proper, is never foul.

The cess-pool system, with all its evils of soil saturation and dangers from sewer gas, from non-ventilation of the cess-pool, especially in winter, when the house is warmer, is in vogue here, as generally where there is a water supply and no sewers. To a large extent this is remedied by the new sewers, but where there are no sewers, still remains. Many do not consider the danger of poisoning the air of the house from the gases following back the drain pipe, and as the ground is frozen in winter, the top of the cess-pool hermetically sealed, and the cess-pool half full of fluid contents with the foul gases above, if a pailful more enters by the drain a pailful of the gases must escape back into the house, for it cannot go anywhere else. This is partly true in summer, but not fully, as part of the gases escape elsewhere, but in winter there is no other avenue than the house. This is a common evil wherever cess-pools are used, but the evil is so great that, at the risk of repetition of what is said elsewhere, it is stated here.

It was decided that some general plan should be followed by which the greatest good could be accomplished and the most evils remedied. The advice of the State Board of Health was asked, and as thorough a survey made by its delegate as circumstances allowed. The ground near the river is for a long distance a low, alluvial meadow, overflowed at high water. Near Bridge street the land is a little higher, but above that the low land reaches nearly to the railroad, and a few feet after crossing the railroad there is a steep bank nearly the whole length of Railroad street. The hill from this street up Bennett, past Terrace street, is steep, and leads directly to the high hills which approach the river nearer as you leave New Milford, as is indicated by the course of the railroad. Terrace street also leads directly to steep hills and long ascents, as do all the streets running in that direction. The hills are very steep as you leave New Milford in any direction, except along the valley. The village lies upon a plateau, with here and there steep pitches and abrupt changes from one level to another. There are, as it were, a succession of irregular terraces. The meadow level first, then a narrow one for Railroad and West streets, and a broad plain for Main street, a rise, a narrow divide, then a descent and another plain for East street, beyond which the high hills rise sharply, and the topography of the town is roughly outlined. To be wholly shown, contour lines are necessary, but these I believe,

have never been surveyed. The grouping of the drains gives some idea of the slopes and levels. It was advised that the river be used as the outlet whenever practieable, and that the size of the sewer be adapted to the work expected of it. As there was no difficulty in providing for storm water, except in eertain places, it was advised further, that except where complete drainage was to be secured, the sewer be only large enough to carry the sewage of the region, and to reeeive in addition enough storm water to flush it thoroughly. The drains where no sewers are needed, illustrate the double design of sewerage and drainage. The most unsanitary eonditions in the town were formerly to be found at Railroad street, where open surface drains ran sluggishly along, and found an outlet into a sluggish ditch with little or no fall, which extended through the meadow to the river. Similar drains ran down from the plain above, and a succession of evils was pro. dueed Others emptied into the open field. An outlet is now provided for all. As before stated, in studying the map it must be remembered that while sewerage is the principal object to be accomplished, the drainage of certain portions is so no less. By extensions and connections all points can be reached. By the work already done the principal evils are removed, and the town put in a better condition than the average, respeeting drainage and sewerage. With a pure water supply and adequate means for the removal of waste and filth, other diseases should decrease as well as malarial. Outside of the village and the meadows near the river, the town is hilly. One high hill after another, with here and there elevated table-land or plateaus. The farms lying among these hills and valleys show signs of ample prosperity. The scenery from the summits of the hills is beautiful. Loug reaches of the Housatonic winding through low-lying meadows are seen, and here and there a village nestling amougst the hills. New Milford seems to be a business center for a large farming territory. Of late I learn that some new manufacturing enterprise is to be established there. The prevalence of malaria in the early history of the town, taken in connection with the recent outbreak, is an interesting feature.

Of course it is too early as yet to expect results from the sanitary improvements here carried out, but systematic and thorough drainage promises the best result of any method yet devised for the restriction of malaria, The stagnant soil water, loaded as it usually is with organic impurities, apparently affords an appropriate

nidus for the development of the germ or particulate of malarial diseases. The future history of these two towns, Fairfield and New Milford, especially with reference to the prevalence of malarial diseases within their borders, will be watched with peculiar interest, as they have quite extensive drainage for the ground water. The map, with a general idea of the topography of the town, shows how complete the arrangements are. In many of the houses, as learned while there, the house drain pipes are ventilated as well as trapped. There is no movement more worthy of encouragement than that to remove at once from one's immediate surroundings, the filth that, stored up in the subsoil, or in deeper pits, pollutes earth, air, aud water. Moreover, the germs of disease retain their vitality thus stored for years, and if kept in the soil near at hand, may at any time again poisou some human system. As the seeds of unfamiliar plants are retained for long years in the deep soil, and when from any cause the lower layers of soil are thrown upon the surface and exposed to air and sunlight, spring up and grow and produce plants after their kind, so the seeds of disease may lay long buried, and when again iutroduced into some human system, reproduce the disease. There is then scarcely any greater menace to health than the storage of excremental filth near the dwellings of man. Deep pits upon which vaults once stood have been uncovered ten or fifteen years or more after disuse and covering with earth, and the characteristic fœcal odor still found. The rapid removal of filth, then, is one of the most important sanitary measures, far-reaching in its benefits.

During the past year there has been but little sickness within the town limits, and the year as a whole has been one of unusual healthfulness, especially during the autumn and winter.

THE SCARLET FEVER EPIDEMIC AT POQUONNOC BRIDGE.

This village is located in the town of Groton, about four miles from Groton and about five from Mystic River. In the same town between each village and Poquonnoc there are high hills; the latter therefore lies in a valley between. The map gives a very good idea of the topography of the village. Outside its limits there are scattered farm houses that were occasionally invaded. There are between three and four hundred inhabitants as nearly as I can estimate. The road from Groton follows the Shore Line Railroad until it reaches the station, when it turns and follows the river. There are about a dozen houses before the village is reached. The river is rather shallow and narrow near the village, where it receives a fresh water stream, the outlet of a pond which in its turn is fed by a stream that arises from the hills that inclose this valley. Towards the west are the Groton hills and towards the east are also high hills. These are perhaps uot due east or west, but in that general direction. On the west side the land lies on nearly a dead level for half a mile or more; on the east the land is rolling and somewhat rough until the hills are reached. The village lies in a valley or basin which the river drains, and it receives also the drainage from quite a large watershed. The tide sets up the river to its head, and in very high tides flows into the swampy morass back of the church. There are three of these swampy marshes, but as far as I know this is the only one into which the tide flows, but that is intermittent in its action, that is only at very high tides. One would think these would be the most favorable conditions possible for the production of malaria, but there has never a case developed here yet, so the conditions hereafter described would seem to be most favorable for the production of malaria, still, not a case has yet arisen. The head water of the river is about three feet deep at high tide, but very shallow at low tide. The depth at different points along stream are shown on the map by figures in the course of the river. The railroad embankment leaves a chaunel of about forty feet wide as near as I can remember. The rest is dammed by a solid embaukment. This opening is further obstructed by an apron of wood, upon which rip rap rock has been placed to preserve the embankment, so that the water is uot as deep under the bridge as it is immediately above

and below. Below the bridge is a bar, bare at low tide, leaving a narrow channel, aud at the outlet of the river there is one also, I am told, but this I did not verify.

This bar at the mouth is said to be largely overgrown with eel grass, which has a tendency to obstruct the free flow of the water in and out over the bar. Old inhabitants state that since the growth of this grass and the construction of the railroad embankment, and the development of the bar shown in the map, the waters of the river, especially above the bridge, beforc limpid and clear, and stocked with fish and various forms of crustacea, has become turbid, filled with large floating masses of aquatic vegetation, and innumerable organisms, like jelly fishes, the lowest types of plaut lifc are abundant, and that the food-producing fishes, and the like above mentioned, are no longer found that formerly were plenty. However that may be, the water was found to be generally dark and turbid, more so in the shallower parts nearer shore, where there were masses of aquatic vegetation of the lower types that are extremely simple in their organization. The waters, moreover, seemed to be teeming with the lower forms of animal life that are visible to the eye, but it was not examined microscopically. Below the bridge the river broadens; its general contour is well shown in the map prepared by W. H. Richards, C. E., of New London, under whose direction the cases were located. About the middle of May there were several cases of what was called diphtheria, preliminary to the scarlet fever.

The earlier cases were many of them very mild, but as near as I could learu the first well marked case was on the 14th day of May. In all, until August 15th, there were eight or ten cases of diphtheria, and three deaths. The diphtheria cases almost, if not quite, invariably preceded the scarlet fever, although as mauy that had the latter disease had what were called diphtheretic throats, their friends often stated that they had both these diseases; hence a confusion arose. The eight or ten cases, however, above mentioned, were those where diphtheria was the primary disease. Soon after the diphtheria, scarlet fever appeared, and in a short time became epidemic; at the date mentioned there had been forty cases of scarlet fever and five deaths, this makes fifty cases in all, and eight deaths. The statistics I obtained from Dr. F. A. Coates, who, from intimate personal knowledge, could give the facts accurately as his experience in this epidemic was extensive. I am also indebted to him for a clear and exhaustive de-

scription of the nature of the cases, and the manifestations of the fever, from first to last, in all forms and types of the disease, from the mildest cases to the fatal forms. It was endeavored at first to account for the spread of the disease by contagion, but found that except in a few instances, there was no relation that could be established between successive cases, there was scarce ever any incubation period between the supposed exposure, and the onset of the disease.

The school which had a daily average attendance of about forty, was closed the fourth week in June. The teacher stated positively that there was no attendance by other children of a family if one were sick; in such cases the well children were in all cases withdrawn. In proof of this she showed by the register, that the average attendance had decreased from between thirty and forty to six each day.

Besides this, the fact that scattered cases occurred simultaneously in isolated families living widely separated, where there was no possibility of intercourse, neither the parents nor children coming together for any purpose, in the one case all the traffic being with Mystic River, in the other, with Groton, militated against the theory of contagion. Nor in the same family were the cases successive, with a period of incubation intervening after the second took the infection from the first, but several in one family were seized simultaneously, or nearly so. Then there were a very large number of cases that came down at once within a few hours of each other. Nearly a third of the cases were thus attacked within a short space of time. As expressed by Dr. Coates, there seemed to be a general miasmatic influence, affecting all alike, and the theory of spread by contagion was not sustained by the facts in the case. The extreme constitutional prostration that was characteristic of even mild cases, the numerous sequels, and the rapidly fatal termination after convalescence was apparently completely established, death ensuing within forty-eight hours, when just before convalescence seemed to be complete, and the patient nearly well, where the physicians' infrequent visits were more for the purpose of guarding against the development of any complications than from any need of active treatment. These deaths seemed rather from a complete poisoning of the entire system than from kidney complications, these, although not uncommon, were more readily managed, but in the rapidly fatal cases after convalescence, the brain and nervous system were apparently the cause of death, through

the action of the poison upon the nervous centers. In other instances, the disease from the onset, marched rapidly on to death without any hindrance. There were a few cases after the date mentioned, and some fatal, but there was no general prevalence. In the region to the northward there were many malignant cases scattered here and there, apparently sporadic. There are many that claim such cases originate directly from filth, as every chance for contagion seems excluded.

By a vote of the town Board of Health of Groton, the State Board of Health was invited to investigate the causes of the epidemic of scarlet fever. and report to them any action that might be deemed expedient to protect the lives and health of the people. In response to this request, a careful investigation was made, a part of the results of which have already been given. In the first place, a visit was paid to quite a number of the houses where scarlet fever had prevailed and their surroundings examined, and some interiors also visited. The usual sanitary evils incident to such places were found, but to a less extent than in larger villages, because the territory was sparsely settled. These are the storage of filth in vaults, and especially in unventilated cesspools which are tightly covered with an untrapped pipe from the sink. The wells, for the most part, were at safe distances from the sources of contamination. In some instance, more than the usual care had been paid to the surroundings of the house. The local conditions about the houses would not explain the epidemic. During the investigation, an interesting instance of the communication of the contagion of scarlet fever was learned incidentally. There had been a family of three sisters residing in the village with their parents. One of them married, went to a western city to live, and a little more than a year before had died of scarlet fever. Her clothing was packed and sent to Poquonnoc, and, after alteration, worn by the two sisters, who were still at home. They were both attacked with scarlet fever; but as there were no children near and only old persons in the family besides themselves, no other cases arose from these during that year. That was in 1880. The question arose whether, in some manner, the germs or particulate of scarlet fever had not spread from here; but no evidence was found to trace the origin hence. Of course the contagion might remain if any of the clothing had been worn or handled by others before it had been thoroughly disinfected by air and sunlight, if not directly, by artificial means; but after the

sickness of the two sisters, all such matters were likely to be thoroughly attended to, as their importance had been learned. Although it was not absolutely certain, still it was probable that the scarlet fever was introduced by a child from a city where scarlet fever had been prevailing extensively.

By the almost universal testimony of nearly all the inhabitants and from several unprejudiced observers that had been often through that region, it was agreed that there was a very offensive smell proceeding from the river, noticeable especially at low tide, in hot, muggy days, early in the morning, if near the river, and in the evening. To any one on the river in a boat at certain times the odor was stated to be peculiarly offensive. In certain directions of the wind, it was stated that the odor was perceptible at quite a distance from the river. This had been noticeable but to a less degree during the preceding summer, and it was stated that there had been along the river an unusual prevalence of typhoid fever. For two years in succession, the summers had been unusually dry and the river low. There was stated to be a large escape of offensive gases on stirring up the bottom of the river, and in some places it was asserted that these would at times arise quite freely without any such disturbance. The cause of this odor was found to be the decay of brush, mainly white birch brush that had been put in the river for oysters to set upon. The success of the pioneer in this department, who took some twenty to twenty-five bushels of oysters from a single bush,* had so stimulated the cultivators of oysters that cartload after cartload had been placed in the river, not only of birch brush, but of every kind of brush that could be obtained, from apple-tree trimmings to the brush from forest trimmings of the tree branches. These were carted upon the ice and dumped, to settle as the ice melted, and thrown in in all manner of ways, until it was stated that the river was full above the bridge, except that part directed by law to be kept clear. In some parts, stakes were driven down at short distances apart, to keep the brush in place, and also for oysters to set upon. The preceding summer, the oysters, which had set freely upon the brush, died. Apparently, the decoction from the wood and the results of the decay of brush that had been long in the water proved too strong a dose for them. This added an increased source of ill odor to the next summer's share. In all probability

* The statements varied somewhat as to the quantity. I do not vouch for its exactness.

the animal and vegetable decay were combined in the summer of 1881. For there is little oxidization going on in winter and in cold weather of late fall. The advocates of the purification of rivers polluted by sewage have forgotten or intentionally slurred over that fact. They claim that a river that has received sewage becomes fit to be used as a source of water supply for cities or towns, but do not explain what becomes of the filth in cold weather and in winter, when no oxidization takes place. So here, although the oysters died during the preceding summer, it was probably late, and so the putrefaction was completed the next return of warm weather. However that may be, the compounds formed by the decay of the large masses of brush-wood that were in the river were enough to account for the odors, even if they were the only compounds formed.

This subject was thoroughly investigated. A boat was taken at low tide and the river was explored to the bridge and some way below. It was seen how a comparatively favorable report could be made if brush were taken up (and the men knew where to go for all kinds) that had been in the water but a short time. The odors were slight and there was no great disengagement of gases; but, if a deeper layer was disturbed and those taken up that had been in two seasons or nearly as long, or even longer, as we had examples of each, there was a disengagement of immense bubbles of gas of a sickening odor, and the bush would be encrusted with filth, and floating impurities were often entangled in the branches. In case of birch brush, the inside wood was a pulpy mass, while the tough, tenacious bark held it firmly together, although not preserving shape nor outline. The slimy, black mud that coated the oldest brush, that is, that deepest in the water, and presumably the longest time submerged, was also very offensive. At low tide the stakes and some of the brush were partly out of water. The odors were to a large extent retained in the valley by the conformation of the surrounding hills. The odors would arise and be carried along by the winds, and the point of subsidence would be about where we found the inhabited portions to be. They would also reach the hill slopes much more readily than those living directly near the river, as in the case of malaria. At the commencement of the investigation the prejudice was most strongly against the brush, but after a careful study of causes it was decided, after discussion by the Board, that here was a decidedly unsanitary condition. If human testimony is worth anything, the

air was polluted to an appreciable degree by the products of decay from the brush-wood rotting in brackish water. The compounds thus formed have been specially studied in a long-continued series of observations even now in progress by Prof. Brewer at the Sheffield Scientific School. There was then a general condition to a considable extent affecting all. By the general laws of diffusion these gases were scattered over the valley to the adjacent hillsides. If filth does not directly produce disease, one thing is settled beyond a peradventure, it does render it of a more severe and malignant type, and furnishes the conditions most favorable to an epidemic. While we never thought that scarlet fever was caused directly by the pollution of the air resulting from the decay of the brush, yet it evidently increased its malignancy and severity, and furnished conditions favorable to an epidemic. The following report was made to the Groton Board of Health:

To the Board of Health of the Town of Groton.

GENTLEMEN:

There is no doubt in our minds but that the presence of such large quantities of brush in the river has resulted in conditions detrimental to the health of the village, and has been a very unsanitary element in the case. The brush has caused these conditions in two ways—first, polluting the air by the putrescent exhalations that arise from the decay of wood in salt or brackish water; second, by interference with the free circulation of the tidal waters. Prof. Brewer of the Sheffield Scientific School, a member of this Board, who has for many years been studying experimentally the decay of our native woods in salt or brackish water, thus writes in relation to this case: "The experiments that I have been making for several years in this matter show that any of our woods placed in salt or brackish water produce very abundant and offensive odors, not only of sulphuretted hydrogen (the gas from rotten eggs), but also of other exceedingly putrescent effluvia; that this continues for a long time; that it is equally as bad, so far as the senses can determine, in water that is of full saltness of sea-water, or in that which is diluted with three or four times its bulk of fresh water. This offensiveness does not cease for a long time, and in the case of brush would probably last a number of years. The dead oysters were an element in the case, of course, but in my own mind there is no question whatever but that the brush is

a very unsanitary element, both from their own decay, and from their interference with the free circulation of the tidal waters."

By obstructing the free circulation of the tidal waters filth is retained in the river that would otherwise be swept out to sea; thus the products of the decay of the brush were doubtless augmented by those resulting from the putrefaction of the oysters that set upon the brush but died during the preceding year.

By such pollution of the air conditions favorable to the production of an epidemic are caused, also favorable to the malignancy as well as to the spread of disease. Prevalent winds sweep these exhalations from the river over the village and to the distant hillsides. As the village lies largely in a valley, they arise, diffuse themselves through the atmosphere, until the barrier of the hills is reached, which to a great extent confine them within the limits of the valley. The removal of the brush from the river is therefore recommended, especially from that portion above the railroad crossing.

While we believe that in accordance with the general laws of the disease, so far as known, scarlet fever was introduced from the contagion of some preceding case, and results from a specific poison, we also believe that such specific poison is vastly intensified by pollution of the air by the products of decay as described, and that the epidemic was rendered possible by this contamination of the air which intensified the specific poison of the scarlet fever, increased its malignancy, and furnished the essential conditions for its general diffusion, for it is well known that in epidemics the specific poison of the disease, whatever it may be, acts through a much greater space than at other times.

By order of the Board,

C. W. CHAMBERLAIN, M.D.,
Secretary of the Conn. State Board of Health.

This report was received favorably by the Board of Health of Groton. They had intended to have the brush removed at once and taken by a large scow out to deep water and dumped; but they were at once threatened with an injunction and suit by the deep-sea fishermen if they dumped a single load in the deep water. The following extract from a letter from the chairman of the Board of Health of Groton explains the difficulties encountered. As will be seen, the decision of the State Board of Health was that the decaying brush caused an unsanitary condition;

were, in other words, unhealthful, detrimental to health and life, and likely to increase the severity of any disease that might be introduced.

A similar condition, from other causes, was stated to exist in another town, where as yet there had been no sickness; indeed, once or twice in the same town nearly the same conditions had existed, and no sickness arose. It was stated that all they needed was the germ of some zymotic disease to be introduced to have an epidemic. Shortly afterwards, the predictions were verified, for, from a single case of the disease, diphtheria spread like wild-fire, and in less than three weeks there were a hundred cases or more. In another instance, where similar causes existed, the same was declared true. In less than two weeks there were fifteen to twenty cases of a severe type of zymotic disease, and seventy-five to eighty of a milder type. There is nothing more plainly demonstrated than that filth increases the severity of disease and favors epidemics. These three instances all occurred within the year. There are, it must be remembered, three elements: the filth the nidus or nest for the disease, the germs or particulate of disease, and third, a human system ready to receive it; either may be wanting.

To return to the letter. The chairman states:

We find ourselves embarrassed in the execution of our decree declaring the brush a nuisance and ordering its removal not less than one mile from the shore in Long Island sound. We are met with this state of things:

1. The doctors do not think it advisable to remove or expose so large a quantity of decayed wood at present.

2. We have no place to put it. If it is cast into the sea, the fishermen cry out against it, and threaten the proprietors of oyster beds that they will prosecute every man that dumps a single load; and the proprietors aforesaid are seriously afraid to act.

3. They say they prefer to incur the penalty of disobedience to our order.

You will recollect you suggested the possibility of harm and opposition in dumping it overboard; but I thought there would be no objection to that method of disposing of it.

4. To leave that exposed and putrid smell on any shore in the valley would be fraught with greater danger than at present they are exposed to. We fear this is so. But,

5. Why not bury it?

Bury it where? There is not room enough on the shore, and to bury

sixty or a hundred acres of brush—I do not know the exact area of brush—would be seemingly impossible. We have passed the decree to remove it to the middle of the sea.

What can or shall we do? We should be glad to be and do right in this emergency.

We called on you to examine and decide, and we agreed to abide by and carry out your decision. But I thought we might all of us deliberately review the case, for you recollect you were strenuous for one thing, and that is, that this unsanitary condition of the river was a means of aggravating any epidemic, while you refrain from asserting that the scarlet fever was caused by the brush in the water. I ask your attention to the new and practical aspect of the case. * * *

The opinion was returned involved in the first report, but made more explicit that the brush should not be disturbed until cold weather, oxidation and decay would have ceased, and there would be little danger in its removal. We coincided in the opinion of the physicians of the neighborhood, that it would be dangerous to stir up so much putrescent and putrescible material. It was advised that, should the removal be rendered necessary from any reason, that small portions be taken at a time and burned, by throwing them upon an intensely hot flame in a temporary kiln, so constructed that the smoke should be drawn over an intensely-hot coal fire before escaping into the open air. It was, however, decided to wait until cold weather. During a cold time late in the fall, quite a quantity was removed. It was amusing to hear the objection raised that, because the brush was not then offensive, it never could have been the means of doing any harm. The very fact that the cold weather, when oxidation was at a minimum, had been waited for, was lost sight of; and because, according to rule, putrescent decay was not then actively going on, was proof sufficient that it never had been, and that the brush had never been offensive. Of a similar nature was the published statement that those living near a heap of the removed brush did not find it offensive, and made no objection to it. Of course, it was not then particularly objectionable, as the time had been taken for its removal when decomposition was going on at the slowest rate, if at all; hence, little or no bad odor.

The following regulations of the Groton Board of Health are published, not as a model in all respects, but as possessing many practical common-sense qualities, and judicious, on the whole, in their recommendations:

RULES AND REGULATIONS OF THE BOARD OF HEALTH OF THE TOWN OF GROTON, CONN., ADOPTED AUGUST 13, 1881.

1. That in all Epidemic Diseases, like Small-pox, Scarlet Fever, Diphtheria, etc., the houses where such disease exists shall be accessible to those only that have a right to be there, as physicians, nurses, or for some useful and necessary purpose, and that all other persons be positively excluded from such infected house during the prevalence of the epidemic disease therein.

2. That whenever a house is infected from such disease, or when any one dies in a house so infected, that the children, if any, belonging to and living in said house shall be kept away from school or other places of resort; nor shall any person belonging to or frequenting such infected house be allowed to visit other houses, or to go at large, until such infected house has been thoroughly renovated and disinfected, and such person cleansed of the disease.

3. That whenever any person dies of such epidemic disease, the body shall be decently buried without delay, and privately.

An observance of these rules is required, under the penalties of the law in such cases provided.

And we recommend that all cesspools, vaults, and possible nuisances be looked to and cleansed, and all filth removed and buried, aud especially that any such trouble near to any well of water be thoroughly examined. These things should be done at once, without waiting for disease to break out. But when contagious disease does break out, let there be no panic or noisy proclamation of danger, for that aggravates the evil; but let the local community quietly organize benevolent and efficient committees to see that all local causes of deadly disease are removed, and that carbolic or quick-lime, or other disinfectants, are speedily and freely applied; and let others see that all sanitary rules are strictly observed, and a notice posted on the door where there is danger; and others still that the wants of sick families, thus shut up, are met, so that there shall be no occasion to violate sanitary rules. And if these suggestions are taken and acted upon it will save both the lives and health of our afflicted fellow citizens, as well as expense to the town. The Board of Health, when called upon, are ready to coöperate with you, so far as in their power to do so.

GROTON, August 13, 1881. BOARD OF HEALTH.

The history of every epidemic is worthy of record, as it is only by a series of carefully-recorded facts that we can learn anything concerning their laws, which are doubtless clear and well-defined enough, if we only knew what they were.

Scarlet fever is produced by an organized solid; and that the

particulate which produces it may not be originated *de novo* from filth directly no one can assert positively. Indeed, our knowledge of the cell, the lowest organized element that we know certainly about, has been wonderfully simplified of late, while formerly we considered that agent that builds up every tissue of the body as composed of a cell wall enclosing protoplasm, and a nucleus, with perhaps a nucleolus within; first, our confidence in the cell wall was shaken, and we found it only a constituent of age caused by a hardening of the outer walls; then a nucleus was found not essential, and a formative particle of protoplasm is all that is left; the rest may or may not be. So, as we delve deeper in this microscopical world, whose relative importance to our own lives we have but dimly discovered, we may unearth some truths concerning these little entities that cause disease that may settle many of these vexed questions of origin.

HEALTH RESORTS.

From time to time, one and another of the places that come under this title have cursorily been brought to our notice, and received some slight attention. But, from what has been incidentally learned, the advisability of making a grand and systematic survey of these places has seemed imperative; and, upon presentation of the topic to the Board, it was determined that systematic work should be done as thoroughly as possible, and in some regular order, taking advantage, of course, of any chance visits in the neighborhood. It is not to be inferred that there has beeu anything in general learned concerning unsanitary couditions that prevail at health resorts in this State, but from the importance of the subject and from what has resulted from similar work elsewhere. The importance of considering what provisions are presented for escape from the buildings in case of fire, in accordance with the suggestions of the Illinois State Board, caused that to be added to the points to be investigated. The greatest sanitary evils are usually found where a large, but heretofore little-used, old country tavern suddenly becomes popular as a summer resort. The primitive regulations still survive, and, as a result, sickness breaks out. But, as shown by the careful investigations of a Boston doctor, the more common result is that the seeds of typhoid fever and kindred diseases are implanted in the system during a summer spent in such a pleasant, sequestered spot, to be developed in the autumn soon after the return home. When the real results of the trip become apparent, people that are extremely careful about the sanitary surroundings of their own homes and even of that of their neighbors, will, without a thought of the desirability of paying any attention to the subject, take their families into a house where there are cesspools within a step of the back door, and as near to the wiudows of the sleeping-rooms of their children as circumstances will allow, where the well is between the said cesspool and the privy vault, flanked by the pig-pen for convenience. The rapid accumulation of waste and filth soon produces its legitimate results, as neither party think of taking any extra pains in the removal of the waste and excreta.

The number of health resorts in this State is very large. Both the shore and mountains are represented. Each have their peculiar liabilities. Another source of danger lies in new and not fully

completed houses. The sanitary surroundings, except so far as absolutely necessary, are usually neglected until the last thing. An illustration of this general nature occurred at one of the resorts near the shore this year. After nearly every one had had bowel trouble that was stopping at the house, and some symptoms of continued fever, resulting in typhoid fever in two or three cases that developed after removal, directly into typhoid fever. An investigation showed the following sanitary evils, some of which were, in a sort of general way, known, but not supposed to have any relation to the sickness in question until attention was called directly to them. The first was a large garbage heap, oyster shells, lobster shells, leaves of vegetables, pods of peas and beans—in a word, kitchen refuse. Upon this was poured a portion of the slops, and, in general, it was a catch-all for garbage; so that, from bones and the like, enough animal matter was added to contribute a full quota of the peculiarly detestable odor of putrefaction. Doors and windows on that side of the house, when to the windward of this heap, were at once closed. This was soon remedied by thorough removal and a disinfection of the soil. The main drain from the house, through the barn, down to the sea, became choked up. When this was dug out to find the obstruction, it was found that the drain passed the well very closely, and that right here there was a break, and had been for some time, so that a regular channel had been worn from the drain to the well and the water polluted. A general sudden outbreak of enteric fever or of bowel diseases generally, is usually due to polluted water. Diphtheria is apparently more readily transmitted by the air. When the use of the well-water was discontinued, the bowel trouble ceased directly. A little care in the first place would have averted all this trouble. There have been but few instances in this State of extensive sickness at health resorts, and they are, for the most part, carefully managed. Still, those that have such places in charge should especially know, and act in accordance with their knowledge of sanitary laws. It should ever be in their minds that neglected filth in the immediate surroundings is more potent for evil than the bright, clear, invigorating air from the sea or mountain is for good, and that health cannot be secured while continually drinking polluted water, even in the most carefully selected surroundings. An important field is here offered for study, the results of which are intimately related to the protection of the health of the people.

PYOGENIC PNEUMONIA.

This more properly stands for a form resulting from infection that results from changes within the body, but, in want of a better name, may be used for that variety resulting from filth, and especially polluted air. It has long been recognized that breathing contaminated air predisposes to catarrhal and other lung troubles, by inducing a constant congestion of the lung tissues by its irritating qualities, sets up a chronic low grade of inflammation, and even induces pneumonia. Polluted water less directly produces similar trouble, but mainly by depressing the system generally, so that a cold is followed by severe inflammation. The following cases illustrate the latter variety.

In a family, both husband and wife were attacked with pneumonia, the one two days after the other. Both had the characteristic signs of pneumonia; but the wife had two severe chills the first day, and chills or increased fever every other day, until eleven days after the attack, when she died. There had also been a great deal of sickness in the family during the winter and spring. The husband, however, recovered. They had used cistern water, but latterly had depended on a neighboring well for drinking water. The sink drain passed underground within two feet of the cistern, and had become stopped up, which was the cause of their ceasing to use the water of the cistern for drinking, using it for all other purposes. On examining the cistern, the top was found covered with a soapy scum, almost like soapsuds, proving a clear connection of the drain and cistern. Unfortunately, they had not learned that the assurances of our health are in the corrections of our dwellings, our sink-drains, and our sewers; but it might have been better for them if they had. In another instance, where there was a series of cases in a school, on examination it was found that a large cesspool, which received all the filth from the water-closets, and the laundry water as well, was practically ventilated into the sleeping-room of the victims. As the cesspool was tightly covered on top, the ground frozen, and an open pipe leading directly from the bed-room wash-basins, when the large tubs of hot water from the laundry were emptied, the gases of the cesspool were forced through this pipe and breathed by the children. Of course, at all times, especially in winter, the gases found their way here. There were several deaths, and many more sick.

CESSPOOL VENTILATION.

The following is one out of many illustrations of carelessness in this regard:

A gentleman who had lost several children from diphtheria wished his house inspected. Everything about the house seemed well managed, as it was the abode of wealth, until the disposal of the filth began to be investigated. As there was a good water supply and no sewer, of course we found a cesspool of large size, covered closely on top, and unventilated. Upon entering the cellar, a large opening near the furnace was noticed. Upon inquiry, it was found to be a drain for water which sometimes entered the cellar, leading directly to the cesspool, untrapped. Every time anything passed into the cesspool an equal bulk of foul air or gases was forced back into the house, and more readily into the cellar. The furnace had no cold-air box, but, as is too often the case, took the air from the cellar directly. If the owner had contrived an apparatus to send all over his house the foul air and gases generated in the cesspool, he could not have succeeded better. Perhaps he believed that his cesspool had no relation to the health of his family. Death taught him a different lesson, and in the future the teachings of sanitary science will not be neglected. A forcible illustration of the ease with which gases will pass long distances through the earth was afforded by the bursting of a gas main in one of the streets of New Haven some years ago. It was noticed that the inmates of several adjacent houses did not come out as usual one morning, nor was there any stir about the houses. The neighbors broke in and found the inmates lying insensible in their beds, with a powerful smell of gas in the rooms. *As gas was not used in any of the houses*, nor were there any connections for it iu any of them, it was difficult to tell where the gas came from. At length, it was found that a gas-main had burst in the street, some sixty feet away, and the gas had diffused itself through the ground and entered the houses by their cellars, and thus poisoned the inmates. Fortunately, they were found in time to save life, but many were a long time sick. In a similar manner, but, of course, in a less amount, the cellar, especially in winter, when it is warmer, draws in all the impurities that may be in the ground air, and thus it is an unfit source to take the air to supply a furnace.

SLAUGHTER-HOUSES.

It is a question of increasing interest whether something of the nature of *abattoirs* should not be required by law in this State. There are now so many appliances for rendering the work here conducted harmless to health, and indeed comparatively inoffensive, that the only excuse for not employing them is their expense. This is the main reason for compelling the union of all such establishments in a city into one, so that, for their combined use, the expense to each would be small. All the offal can be rendered into a dry, inodorous powder of two grades, each of which brings a good price as a fertilizer, and the processes are completely inodorous; one standing closely to the apparatus would perceive no odor. There are certain regulations that would render such establishments less objectionable if they must exist separately. All blood and fluid, or semi-fluid substances, should be received and kept in galvanized iron receptacles and not upon the floor. All offal should be similarly placed and at once removed from the premises. The hides, if they must be kept, can be deodorized partially by brushing over the fleshy side some antiseptic. The floors and walls should be washed thoroughly and gone over once with the sulphate of zinc and salt solution.

THE RESULTS OF SANITARY SCIENCE.

It was stated last year in this connection that the sanitary engineer was abroad and health boards actively at work. An illustration has already been given of what can and has been accomplished by the results achieved by the New Haven Board of Health in placing their city among the six healthiest cities in the world. The change in Detroit, Mich., from one of the unhealthiest pestilential cities to the very reverse, so that it ranks among the healthiest, was also noted. At Croydon, Eng., by the combined action of sanitary engineer and health board, the death rate has been reduced from 25 to 16 per thousand. Now all putrescible matter, instead of remaining for months and years in a condition of putrefaction, flows upon the land undecomposed within two hours; so in a number of other places. "It may be roughly estimated that a quarter of a million people were saved from death in the last ten years ending 1880, who would have died had the death-rate been as formerly in England. If 12 cases of serious but not fatal illness be reckoned for every death, it follows that about 3 millions of persons, one-ninth the whole population, have been

saved from a sick bed by some influences at work in the past decade that had not been previously." It is not strange that intelligent people should believe in sanitary science. A volume might easily be filled with illustrations of this topic. A passing allusion is simply made here to show that the results are capable of demonstration. The narrow-minded illiterate, whose thoughts as well as lives are cribbed and confined by a narrow range, naturally see little good out of their own routine. Argument and even demonstration are to these of little value.

DEATH OF DR. LEWIS WILLIAMS.

It becomes our painful duty to announce the death of Dr. Williams of Pomfret, in recounting the events of the year. He was a warm and earnest friend and advocate of the State Board of Health, and its firm supporter. Of a broad and well-cultivated mind, he was up to his death an active student, and kept full step with his brethren in everything that pertained to medical science; an earnest humanitarian in the best sense of the word; nothing that promoted the welfare of mankind was indifferent to him. His death is a great loss, for his well-trained miud and disciplined judgment made his observations and reports of inestimable value. His statements were carefully accurate and his opinions worthy of the fullest confidence. The broadness and catholicity of his mind were remarkable, remote as he was from that contact with others in the same work. But he never suffered his isolation to narrow his mind, and was as ready to judge a new fact on its merits as in earlier days. In all relations of life he won the encomiums of all that knew him.

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Wanklyn, Water Analysis.
Winslow, Influence of Light.
Wilson, The Ocean as a Health Resort.
Watterly, Domestic Hygiene.
West Ewing, Improvement Society Report.
Woodward, Camp Diseases.
Waring, Sewerage of Village Cities.
" " and Drainage of Cities.
" Storm Water in Town Sewerage.
Working of Contagious Diseases, Acts in China.
Waller, Report on Croton Water.

TREASURER'S REPORT.

Expenditures from Dec. 1st, 1880, to Dec. 1, 1881,	$2,216.87
Salary of Secretary,	1,000.00
	$3,216.87
Cash on deposit,	203.13
Total,	$3,420.00

RECEIPTS.

Cash,	$3,000.00
Balance old account,	420.00
Total,	$3,420.00
Bills outstanding, about,	$475.00

C. W. CHAMBERLAIN, M.D.,
Treasurer.

Approved,
C. A. LINDSLEY, M.D.,
Auditor.

DETAILED STATEMENT.

Printing.		
For Bureau of Vital Statistics,	$400.10	
For Sanitary Department,	237.00	
		$637.10
Sanitary Engineers,		231.50
For Library,		307.46
Traveling Expenses,		341.84
Photo-Lithographic Company,		307.00
Postage, Express, and Telegrams,		168.34
Legal Advice and Clerical Services,		119.00

Sanitary Examinations and Analyses, .	$54.63
Stationery, Twine, and Sundries, .	50.00
Total, . .	$2,216.87

C. W. CHAMBERLAIN, M.D.,
Treasurer.

I have examined the accounts of the Treasurer of the State Board of Health for the year ending November 30, 1881, and have compared them with the accompanying vouchers, and find them correct.

C. A. LINDSLEY, M.D.,
Auditor.

The same remark made last year with reference to the accounts applies this year also; that is, that the yearly statement has to be made with reference to the work then finished, and consequently, as the fiscal year ends the last day of June, and our accounts are made up from December to December, they represent really parts of the accounts of two years. It makes little real difference, however, as it would be difficult, even if the two coincided, to draw the line rigidly until a certain work was finished. Although the expenditures this year are larger, the stock on hand of blanks and the like for our necessary work is larger, reducing the expenses in that line for the ensuing year, materially. Our working balance, however, for the next quarter will be very small, and as usual a period of strict economy must intervene before any new work can be very actively pursued. That is one trouble of our limited means; before commencing any prolonged investigations we must wait for a proper accumulation in the treasury. After a certain ground has been gone over our reports will not need to be as large, but just now, as in the early years of all such institutions, there are certain topics that must be disposed of as a sort of ground-work, both for enlightening the people, and also as a reference and foundation for more detailed and special work, in place of a great deal that is of general use, and, as before stated, essential in preparing the way for the other. As soon as finances will admit we hope to establish a sanitary laboratory where many of the interesting questions can be investigated experimentally. The meteorological conditions with reference to disease opens an intensely interesting field, if we were only financially able to enter upon it.

VACCINATION;

BY

PROF. C. A. LINDSLEY, M.D.,

MEDICAL DEPARTMENT, YALE COLLEGE, DECEMBER, 1881.

"*Nothing however beneficent can escape the criticism of the times in which we live. The criticism of vaccination, often passionate and violent, relates chiefly to points which, however interesting they may be, leave the main question unaffected. We may speculate about the possibility of the potency of vaccine being exhausted in the human family; we may be surprised to find that people with good vaccine scars sometimes have Small-Pox; we may dispute as much as we please about the average period when re-vaccination may be considered a prudent safe-guard; * * * but after all we find that we rest in a security against the horrid pestilence of Small-Pox unknown to former generations.*"—DR. GEORGE DERBY.

VACCINATION.

BY C. A. LINDSLEY.

It is one of the recognized duties of the State Board of Health to acquire and diffuse among the people such information concerning the care and protection of their health as will be of practical use to them.

The fields of study pertaining to public hygiene are wide and varied, and among them all there are few, if any, at the present time, of greater significance than vaccination. There are few, if any, topics, which deal with human life at all approximating to the importance of this, respecting which there is so much misinformation and unfounded prejudice in the public mind.

It is, therefore, an eminently proper subject, upon which the people should have correct information, that their unjust prejudices may be removed and that they may enjoy the best results of this beneficent boon.

It is the purpose of the present paper to state, in brief and plain language, what vaccination has done for the human race and how it can be employed most safely and effectively.

In 1798, more than eighty years ago, it was announced by the great Jenner that the inoculation of vaccinia, or cow-pox, in the human subject was a full and sure protection from small-pox. Probably no single discovery ever made by man has contributed so much to human longevity. The greatness and value of this specific preventive of small-pox can never be successfully controverted.

The claim of Jenner that vaccination is competent to exterminate small-pox and to wipe out from the list of human ills this loathsome contagion is now established by the verdict of science, as based on the experience of millions and millions of facts, noticed by the best medical observers and thinkers in the world.

For the very reason that its protective power is so nearly infallible and its use so nearly universal, the present generation are comparatively exempt from small-pox, and therefore cannot and do not adequately appreciate the magnitude of the blessing which Jenner's discovery has conferred upon mankind. Vaccination owes its whole importance to its relations to small-pox. It confers upon the human system no new advantages, but rather is temporarily itself a source of some discomfort and suffering. Its whole value consists in its power of protecting one from that most fatal of human maladies, the small-pox. Its general observance and practice is in obedience to the law, "Of two evils one should choose the least."

WHAT HAS VACCINATION DONE?

We can best understand the question by inquiring about the prevalence of small-pox in the last and previous centuries as compared with its prevalence now.

In past times, throughout Europe and in other countries small-pox was universally regarded as one of the greatest scourges of mankind. The bills of mortality during the last half of the last century showed that ninety-six one-thousandths, almost one-tenth, of all the deaths in London occurred from this sole cause. In the great cities, on an average of a long series of years, it can be shown that one-third of all the deaths which took place in children less than ten years old arose from small-pox.

"Not a decade passed in which the disease did not decimate the inhabitants in one country or another, or over great tracts of country; so that it came to be more dreaded than the plague."

In Berlin, according to Caspar, from 1783 to 1799 small-pox caused one-twelfth of the total mortality.

In France, 30,000 persons perished annually of this disease. Medical treatment availed but little to stay its ravages. A proverb of the time illustrated how resignedly the people accepted their fate: "From small-pox and love but few remain free."

Among remote communities, where it had not previously prevailed, and where therefore none were exempt from its contagion by previous suffering, its ravages have been fearful to contemplate.

In 1518, it made complete the depopulation of St. Domingo, previously begun by sword, fire, and famine. Mr. Prescott, in his "Conquest of Mexico," describes an epidemic as sweeping over

the land like fire over the prairies, smiting down prince and peasant, and leaving its path strewn with the dead bodies of the natives, who (says another) "perished in heaps like cattle stricken with the murrain." Washington Irving's "Astoria" mentions several epidemics among the American Indians in which "almost entire tribes" were destroyed.

During a single year, about 1560, says De la Condamine, it destroyed, in the province of Quito, upwards of 100,000 Indians. In later days, we have accounts of epidemics raging with no less destructive power over Kamschatka, Greenland, and Iceland.

Its extreme severity in these latter-mentioned instances was due to the infection being suddenly spread among peoples, none of whom were exempt by previous attacks. In civilized countries, where intercommunication was constant and the contagion continually conveyed about by uninterrupted intercourse, the disease perpetually existed in all communities, but finding subjects only among those who had not already had it, and were so exempted. So general and so contagious was the infection that very few passed childhood without the consequences of exposure to it; and hence an adult person not pit-marked in the face was the exception to the general rule.

But the deaths from small-pox fall far short of a full realization of its evils. It was not fatal to all its victims. The survivors of the malady were, in many instances, only spared from death to be lifelong sufferers from various severe physical afflictions, which, if not soon fatal, marred the enjoyment of life and often abbreviated its duration.

The great English historian Macauley eloquently compares the evils of small-pox in England toward the end of the seventeenth century with the ravages of the plague. He gave small-pox the prominent eminence among destructive agencies, calling it, "the most terrible of all the ministers of death." *"The havoc of the plague," he said, "had been far more rapid; but the plague had visited our shores only once or twice within living memory. The small-pox was always present, filling the churchyards with corpses, leaving in those whose lives it spared the hideous traces of its power, turning the babe into a changeling, at which the mother shuddered, and making the eyes and cheeks of the betrothed maiden objects of horror to the lover."

* History of England, vol. IV, p. 530.

Survivors often found that although life was spared the boon was of questionable value, it was so much shorn of what made life enjoyable.

In many, sight or hearing, or both, were impaired or totally lost; and thus maimed, mutilated and disfigured, they dragged on a sickly, miserable existence, to become speedy victims to consumption, scrofula, or some other fatal disorder.

Sir Gilbert Blaine stated that the report of the Hospital for the Indigent Blind showed that two-thirds of its beneficiaries had lost their sight by small-pox.

The people of the present day have no familiarity with the horrors which small-pox may cause when uncontrolled. In our times, the happy immunity which we enjoy, the almost entire exemption of the present generation from the ravages of this dread destroyer of life and happiness, is wholly due to the protective power of vaccination.

So well is this understood, that in all communities where health boards exist, clothed with adequate authority and being intelligently alert, small-pox is never permitted to be propagated beyond the first few cases in which it may occur.

Vaccination is therefore a subject of such considerable import as a measure of public hygiene, that it deeply concerns every community upon which it is practiced not only that it shall be done, but done in the best, safest, and most efficient manner.

There are several questions which present themselves demanding answers, before deciding how vaccination may be most successfully employed in aid of public hygiene.

Shall vaccination be compulsory?

What virus should be used?

What are the evidences of a successful vaccination?

How often should vaccination be repeated?

Who are proper subjects for primary vaccination?

Who are proper subjects for re-vaccination?

COMPULSORY VACCINATION.

The question of *compulsory* vaccination is one of too much magnitude to be fairly discussed in this paper. I will therefore dismiss it with the statement that it is practiced in several countries in Europe, and partially in several States of the Union. Thus Massachusetts and Rhode Island require all attendants upon the public

schools to be vaccinated before they can be admitted. Hartford is the only city in this State, so far as the writer knows, where vaccination is made a condition of admission to the public schools. The same requirement is enforced upon the beneficiaries of other public institutions in many places. And wherever compulsory laws exist and are enforced they supply the most satisfactory and conclusive evidence of the value and power of vaccination in protecting the public health.

THE QUALITY OF VACCINE VIRUS.

There are several varieties of vaccine virus.

1. That obtained directly from a young and healthy heifer which has been inoculated with virus transmitted by the same process of inoculation through previous heifers in succession from a cow having the disease, cow-pox, in the natural way. This kind is called *bovine virus.*

2. Virus obtained from the human subject after successful inoculation with any active vaccine virus. This kind is called *humanized virus*, because it has been transmitted through the human subject.

The humanized and the bovine, as above defined, are the forms almost exclusively employed at the present time. But there have been and are still in occasional use other kinds of bovine virus. Theorists and experimenters have used virus obtained by inoculating kine with the products of human vaccination. This is called *retro-vaccination* and is practiced in the expectation that by passing again into the system of the cow it will recover any virtues it may have lost by frequent transmission through the human system.

More reckless theorists and experimenters have inoculated the cow with the pus of small-pox taken from the human subject. This is called *variolation.*

Still another kind of vaccine virus has been obtained by inoculating kine with the matter from a similar irruptive disease of the horse, the horse-pox. This is called *equination.*

These three forms of bovine virus last mentioned, viz.: retro-vaccination, variolation, and equination, are not frequently resorted to in this country as a source of supply, and as this paper is intended to be practical, the consideration of them may be disposed of very briefly.

Retro-vaccination or the inoculation of kine with vaccine lymph which has been humanized, has not resulted as was expected, in

restoring any lost powers or energizing the active virus of the lymph. Observers very unanimously agree that the lymph so produced is not at all improved in quality by transmission through the cow. On the contrary, it is weaker in infectiveness until it has again become humanized by one or more passages through the human body.

The scientific fact that humanized vaccine is not improved by retro-vaccination, being now satisfactorily determined, and the operation being rarely successful, it is quite probable the practice will fall into disuse.

In this country it has never been much practiced except in an experimental way, but in Naples and other parts of Italy it has been more prevalent.

The attempt to renew the stock of vaccine virus by inoculating cows with the lymph of small-pox from the human subject has been made many times. Variolation is not so often successful as retro-vaccination. Seaton says, "that for one case in which the inoculation succeeds it will fail in at least a dozen." Martin, the best authority on vaccination in this country, says, "that on the fingers of one hand may be counted the experimenters who even claim success." There is, however, satisfactory evidence that it has occasionally proved successful; notably in England, where virus propagated from such original stock has been employed in many thousands of cases with such results as to remove all doubts of its protective power. On the other hand, says Dr. Martin,* "more than once or twice virus resulting from such experiments, issued widely by jubilant *savans*, has been employed, and the result has been a wide diffusion of small-pox." Hence the propriety and safety of variolo-vaccination is very questionable. Virus from this source is not at present used in this country.

Equination or the inoculation of kine with the horse-pox is another mode of developing the disease, but as it is chiefly interesting in its scientific aspects, is difficult to accomplish and not demanded by any need for vaccine supply, it is a matter of little practical concern.

Excluding, then, retro-vaccination, variolation, and equination as belonging more to the domain of scientific pathology than to the daily duties of the medical practitioner and the interests of his patients, we may confine our attention to the study of the ordinary

*Trans. Amer. Med. Assoc. 1877.

form of bovine virus as derived by inoculation of kine from an original case of cow-pox, and of the humanized virus as obtained by passing the bovine through the human system.

Let me here state that all the bovine virus now used in this country is of the "Beaugency" stock. On the 26th of April, 1866, a case of spontaneous cow-pox in a milch cow was discovered at Beaugency, near Orleans, in France. From this cow another cow was inoculated, and from the second still others, usually heifers, in succession without interruption down to the time of the Franco-Prussian war, when for most evident reasons the succession of the "stock" was lost, in France. But most fortunately for America, and perhaps even for the world, through the philanthropic enterprise and energy of that celebrated vaccinator, Dr. Henry A. Martin of Boston, some of this virus was brought by special messenger to him, in September, 1870. The virus he received was from the 258th, 259th and 260th of the series from the Beaugency cow. Dr. Martin and his son, who some years ago succeeded him in the business, have perpetuated it uninterruptedly to the present time. All the other producers of bovine virus in this country have their stock from Dr. Martin, Senior or Junior. The interesting question respecting bovine and humanized virus as just defined is, Which is the best? The true answer will be based upon the comparative protective power of each, and the effect of each as liable to influence subsequently the health of the party vaccinated.

WHICH IS MOST PROTECTIVE, BOVINE OR HUMANIZED VACCINE VIRUS?

Let us first correct a popular error, which is, that no person can suffer from small-pox twice; that one attack of small-pox is an infallible safeguard against future attacks. Many well-authenticated instances are on record of the same individual suffering twice and even three times with the disease, and in some cases the last attack was not modified by those previously endured. Small-pox, then, does not always prove an infallible protection from small-pox. It is not reasonable to expect that vaccination should be any more protective than the disease itself. So, as small-pox does not infallibly protect its victims from future seizures, neither is vaccination an absolutely infallible protection. There is good reason, however, to believe that vaccination properly performed with genuine active vaccine lymph *is just as protective as an attack of small-pox.* It is not reasonable that it should be any more so.

But small-pox in any form very rarely occurs again in a person who has once had it. It is the marked exception to the rule. But small-pox in a form called varioloid is not now very uncommon in persons who have been vaccinated. In most such cases vaccination has not proved as protective as small-pox would have been. Where shall we find an explanation of this defective protection? Let us cast a glance back at the early history of vaccination and observe its results along from time to time, down the four score years it has been in use.

Jenner made his first vaccinations with the lymph of the original disease, cow-pox, as it occurred naturally in the cow; and his subsequent vaccinations were made with lymph taken from the human subject. Having once inoculated mankind with the disease, the product of that inoculation was used in other human subjects, and thus it has been transmitted by successive vaccinations of persons, through thousands and hundreds of thousands of human beings from the time of Jenner down to the present. Jenner believed that the humanized vaccine lymph lost none of its efficacy by transmission through the human body. That belief is still shared by many physicians at the present time. But from an early period in the practice of vaccination, there have been some to call in question this faith, and to doubt if humanized vaccine does not become gradually enfeebled by so many successive transmissions without, however, altogether losing its preservative property. Now because, until within quite a few years, the use of humanized vaccine has been almost universal; and because the National Vaccine Institution of England has maintained, from the time of Jenner to the present, this mode of propagation without renewing the stock from the original source in the cow, it is possible to compare the results of vaccination in the earlier years with those of the later, in the cases in which virus of shorter and longer humanization has been exclusively employed.

Fortunately the statistical records found in the literature of the subject, from the beginning of the century onward, enable us to arrive at very reliable conclusions about the matter. The limits of this paper forbid a lengthy and exhaustive analysis of the statistics. I can only illustrate the prominent facts which they develop by quoting a few of the most convincing statements. In London, during the decade 1870–9, in every million of inhabitants 4,779 died of small-pox. Of these so large a proportion died in hospitals, where observations were accurately recorded, it was pos-

sible to determine that over 37 per cent. occurred in persons who had been vaccinated.

The returns of the Registrar-General show also that during the same decade over 1,800 deaths from *post-vaccinal* small-pox occurred in London, in every million of vaccinated persons.

It is just as clearly shown by statistics, that only one case in ten of post-vaccinal small-pox was fatal; hence for 1,800 deaths there must have been 18,000 sick of the disease to every million of the vaccinated population. These were the facts in the last decade, 1870–9. Now let us look back, and contrast the facts of a similar period, in the early part of the century. During the first ten years, 1800–9, the medical profession almost universally believed that vaccination, except in the rarest instances, prevented small-pox altogether. It must be remembered, too, that this faith was based on careful observation. Jenner's discovery was not universally and unanimously received, but on the other hand met with violent opposition and the most unreasonable objections were at first urged against it. There were more anti-vaccinators in the first decade of the century than there are now. The advocates of vaccination believed, with Jenner, that the protection which vaccination would afford to be exactly that which an attack of small-pox would confer against a subsequent attack. They believed its protection to be neither more nor less than that. The anti-vaccinators therefore would have hailed with hilarious delight such facts as, that 37 per cent. of the deaths from small-pox were of persons who had been vaccinated; that the post-vaccinal deaths were at the rate of 1,800 in every million of vaccinated persons, and that 18,000 were sick in the same number. It is wholly inconceivable that such facts existed in the first decade of vaccination or any thing approximating to them, and yet failed to be observed by the watchful and zealous antagonists of vaccination. It is not possible that such facts could then have existed and escaped observation. The protective efficacy was then being tested and its results were watched with the most careful scrutiny both by its advocates and its opponents.

Jenner announced his discovery in 1798. A committee of the House of Commons, appointed in 1802, to inquire respecting the merits of his discovery, for determining if he was deserving of a national reward, after hearing all that the enemies of vaccination had to say, could discover only two cases in which small-pox had occurred after vaccination had been properly performed. In 1806 the Medical Council of the Royal Jennerian Institute admitted the

occurrence of post-vaccinal small-pox, but declared it to be "very rare" and "generally so mild as to lose some of its characteristic marks, and even to render its existence doubtful." In 1811 the National Vaccine Establishment carefully investigated and published an account of two cases in their report for the year. They mentioned one of these as the severest that had yet occurred to them, and also reported that it was their belief that, "since the practice had been fully established, *no deaths* from small-pox had in any instance occurred after vaccination." This was in 1811, thirteen years after vaccination was begun; and as yet no fatal case known of post-vaccinal small-pox. Remember, too, that the exposure to its contagion was vastly greater than now, because it was constantly prevalent. After 1810 the practice had become very general in other countries and cities of Europe, and the statistics were carefully recorded. They show a like exemption from the contagion of small-pox after vaccination. In Copenhagen, then a city of over 100,000 inhabitants, where vaccination was universally practiced, not a single death from small-pox was registered during the thirteen years from 1811–1825. In Annspach, in Bavaria, with a population of 300,000, at that time thoroughly vaccinated, no death occurred from small-pox during the nine years, 1810–18. Between 1804 and 1813, more than two and a half millions of people were vaccinated in France, and only seven individuals of those were known to have taken small-pox.

It was not until vaccination had been practiced fifteen or twenty years that post-vaccinal small-pox became at all common or frequently fatal. Since then, however, the frequency of post-vaccinal small-pox has been steadily and regularly increasing everywhere where the long humanized vaccine virus was employed. Wherever reliable statistics have been recorded, this fact is made evident. In France, from 1819–35, there were recorded 5,467 cases of small-pox after vaccination, of which 51 were fatal. In Switzerland, between 1822–32, 4,211 cases occurred, with 92 deaths. In Copenhagen several epidemics occurred from 1825–35, in which there were 3,093 post-vaccinal cases and 66 deaths. In the London small-pox hospital, between 1826–35, there were 915 such cases, and 54 deaths, as reported by Dr. Gregory. By comparing these fifteen years, 1819–35, with the first decade of the century, a very conspicuous increase of small-pox after vaccination is made evident, as well as an increased intensity of the disease, as shown by the more frequent deaths; the mortality being nearly 2 per cent.

as against a small fraction of 1 per cent. in the earlier period. But during the period from 1836–52, as appears by the carefully kept records of Dr. Marson, of the London small-pox hospital, the mortality of post-vaccinal cases has increased to 6.9 per cent. From 1852–67, even under better hygienic conditions, the death rate, still advancing, reached 7.6 per cent. in the same hospital. And in the last decade, 1870–79, there were 15,000 cases, with a death rate of 9.2 per cent.*

Whatever view of the statistics of vaccination, as practiced with long-humanized virus, one may take, the conclusion is irresistible, that the earlier the period in the use of vaccination, the smaller was the death rate, and the later the period the larger it becomes. From a fraction of one per cent. previous to 1820, it has reached nearly 10 per cent. in 1880.

What better demonstration is possible, that vaccination with long-humanized lymph has degenerated, than this showing affords? The most legitimate conclusion from the foregoing history of vaccination is, that long-humanized vaccine lymph gradually deteriorates; that virus obtained directly from the cow or heifer is far more protective than that which has been transmitted by repeated inoculations through successive human systems for eighty years; that the fewer removes it is from the original source the more protective it is.

No one has called in question the efficacy of animal vaccination. There can be no reason to suppose that it is any less protective now than in the time of Jenner, or that humanized virus, which is but few removes from its source in the cow, is any less protective now than the humanized virus of an equal number of removes in Jenner's day. But there are other evidences of difference than the comparison of results as regards protective power. Let one notice the beginning, progress, and termination of two vaccinations, upon two subjects, or upon opposite arms of the same subject; the one with humanized virus of ancient derivation from the cow, and the other with that fresh from the heifer. The most noticeable differences are in the development of the vesicles and the duration of the induced disease, *vaccinia*. In the case of the long-humanized virus, that of the Jennerian "stock" of the "English Vaccine Establishment," the areola commences at the end of the seventh or beginning of the eighth day. The bovine virus is slower by two

* I am largely indebted to Charles Cameron, M.D., M.P., for the above statistics, in the *Fortnightly Review* for May, 1881.

days, the areola beginning not until the latter end of the ninth or early part of the tenth day, and declining at the end of the twelfth and often not until the thirteenth and fourteenth day. In the humanized virus the whole course of the vaccine disease is often finished and the crust separated on the fourteenth day after the insertion of virus. But the crust of the bovine vaccination never loosens before the twenty-first day, and often not until the twenty-fifth, and even sometimes remaining adherent until the thirty-second. Besides these visible differences in the local manifestations of the disease, there are others, such as altered characteristics of the crusts, and resultant cicatrices, all indicating that the impression made upon the system is correspondingly diminished; and they satisfactorily explain why post-vaccinal small-pox is gradually and steadily increasing in frequency and fatality, after vaccination with the long-humanized virus.

Now what evidence exists respecting the protective power of bovine virus? Animal vaccination is the original form in which the dairy-maids and dairy-men of Gloucestershire, England, were protected, and from whose experience the great Jenner evolved the discovery. Is it equally effective now as it was then? is the important question.

Dr. J. L. Meares, health officer of San Francisco, writes in his last annual report as follows: "The bovine virus (Beaugency stock) has been exclusively used by the health department since its introduction here five years ago. The vaccinations since that time reach the large number of over 80,000. This is exclusive of the vaccinations performed by the physicians of the city generally. . . . I have yet to see a case of variola or varioloid after a successful vaccination with bovine virus."

Still stronger evidence on this point is that of E. Warlomont, M.D., Director of the State Vaccinal Institution at Brussels. He says that, "out of more than ten thousand vaccinated at Brussels with animal vaccine, from 1869 to 1870, not one case was to my knowledge noted as having been attacked by the epidemic which terrified the world in 1870 and 1871." In 1878 Dr. Warlomont, at a meeting of the Académie Royale de Medicine of Belgium, made an appeal to his colleagues in the following terms: "I have previously said that no such case has been reported to me. I repeat it, and up to the present time, and not one of the numerous medical men whom I have interrogated on the subject has contradicted me. Has there really not been any? That seems to me impossible.

However it may be, I appeal to hospital physicians and those gentlemen attached to charitable institutions to clear up this fact, which, in consequence of the deduction to be drawn from it, requires to be rigorously verified." In the present year, 1881, he writes: "This appeal has never yet met with any response, and such silence is the most eloquent testimony in favor of the method that I could possibly have desired." "This silent eloquence is of greater value, when the ardor is considered with which the adversaries of animal vaccination, of whom a few rare specimens still exist, would have collected the failures; or, if we remember, taking the larger and more general view of the immunity procured by all kinds of vaccine inoculation, that Belgium has had the honor of being the native country of the illustrious President of the International League of anti-vaccinators, who no doubt would have been overwhelmed with the purest delight by such a discovery."

From this testimony we may conclude that if no case of post-vaccinal small-pox has been observed in the course of eleven or twelve years, out of more than 10,000 vaccinated with animal virus, the instances, if there have been any at all, must have been exceedingly rare. And the conclusions of the whole matter from all the foregoing evidence seem well established:

1. That in point of protective power bovine virus is superior to humanized virus.

2. That humanized virus but few removes from its bovine origin is but slightly, if at all, inferior in protective power to the bovine. But that continually transmitting it through the human system is a cause of slow, gradual, and certain deterioration.

The quality of the virus is a matter of such grave concern, that its consideration is not complete with establishing the superiority of bovine over humanized virus, in point of protective power. The bovine vaccine is superior also in other regards.

For a long time a want of confidence in the entire safety of using humanized lymph has been felt. The spectre of other and dread diseases being communicated to the subject of vaccination haunts the mind of anxious parents, and always prompts the earnest question, Is the "matter" good and pure? This fear has been somewhat increased since the occurrence of a few instances of the inoculation of syphilis has been noticed. Although those cases have been, among the many millions of people who have been vaccinated, so exceedingly rare that but very few indeed

have been well authenticated, yet enough have been verified to establish the possibility of such results from the use of humanized virus.

This danger, remarkably slight though it be, is wholly avoided by avoiding humanized virus and by using the bovine, because kine are not subject to that disease.

Confidence in the safety of animal lymph is still further increased, because the results of all scientific investigation of the communicability of the disease of kine to man goes to disprove the possibility of inoculating any diathetic disease with bovine vaccine lymph.

ERYSIPELAS PRODUCED BY VACCINATION.

Up to September, 1870, when Dr. H. A. Martin, of Boston, imported the first bovine virus of the celebrated Beaugency stock from France, the long-humanized virus (often called the Jennerian, because it had not been renewed since the time of Jenner) was almost universally employed. The occasional occurrence of *erysipelas* after vaccination with the Jennerian stock was an evil which no degree of prudence in the selection of the virus, study of coincident influences or of the condition of the subject, could altogether guard against. The liability to this disease, which was always a serious complication when it occurred, and which sometimes resulted fatally, was a source of constant anxiety to the operator and the patient and friends, and not infrequently a cause of unjust blame.

It is now eleven years since the importation of the bovine stock into this country, and many hundreds of thousands have been vaccinated with it, affording an experience sufficient to base a judgment of its merits upon. It is said that erysipelas is particularly liable to occur in re-vaccination with humanized virus. Dr. Martin asserts that, with his own hand, in 1872–73, he re-vaccinated about twelve thousand patients with bovine virus, and there was not one case of erysipelas among them all, and he had never known a case following the use of bovine virus at any other time. In 1877, he publicly announced in the Boston *Medical and Surgical Journal* for February, that bovine virus was not only exempt from the risk of causing erysipelas, but that it was absolutely *prophylactic of erysipelas.* It protects from erysipelas.

In reply to an inquiry by the writer, if his more recent experience since 1877 had given him any reason to modify his opinion

in regard to this invaluable and important quality of bovine virus, he writes, in a letter dated Dec. 9, 1881, as follows: "The immunity from erysipelas, either during the course or after the course of the vaccina induced by the use of true bovine vaccine virus (*i. e.*, virus from a young bovine inoculated from another, and so on back to original "spontaneous" cow-pox in the milch cow) is something ascertained beyond all doubt or question."

This testimony by a competent witness, after so many years of watchful observation, and when the bovine virus has been used upon persons to the number of several millions, ought to be conclusive.

These facts seem to be well established, viz.: that bovine virus is more protective than long-humanized virus; that it is free from the danger of communicating other diseases, and especially syphilis; and that erysipelas, which is the pest of humanized virus, does not occur at all after the use of bovine virus, but that it is even *prophylactic of erysipelas.*

For it is scarcely conceivable that so many individuals could be wounded, even so slightly as by an abrasion or puncture of the skin, without some of them suffering from erysipelas, if the application of the bovine lymph was not protective against it.

But all these superior merits of bovine virus apply only to a pure and genuine virus.

The business of producing the bovine virus has been undertaken in this country by a host of persons, some of whom have more enterprise than skill or knowledge of the subject, and often with so sharp a scent for the pecuniary profits that their moral integrity forms no obstacle to putting in jeopardy the public health, if their gains may be thereby increased.

The cultivation of bovine vaccine virus may be justly considered a skilled pursuit, requiring for success a liberal measure of training, experience, judgment, and knowledge. Whoever may possess these qualifications and will faithfully employ them can always produce virus of better quality than one who is deficient in them. It is not a mere manufacturing business, in which success depends upon getting the largest returns from the smallest outlay. Nor is it a commercial calling wherein a shrewd observer can surpass his competitors by buying and selling with judicious reference to the fluctuations of the market. In short, it is a pursuit in which money-getting should always be (although it is not always) secondary to the production of a safe and reliable vaccine virus,

which will most effectually protect our fellow-citizens from the contagion of small-pox.

Bovine virus is supplied for use in several forms, as,—the crusts formed by the drying of the vesicles, the lymph stored in small glass tubes, and the lymph dried upon the points of quills or upon bits of ivory prepared for the purpose. In other countries, still other methods have been practised. In Italy, the entire pustule has been excised from the animal and preserved between bits of glass. When used, fragments of the flesh thus excised are inserted in the arm of the subject. On one occasion, thirty-eight children, vaccinated from such portions of cut-out pustules in a state of putrefaction, were seized with convulsions and phlegmonous inflammations, and many of them died.

The dried crusts taken as they spontaneously separate from the animal contain the active lymph in a dry state, well adapted, with care, to preserve its active properties a long time. Much care and attention to the condition of these crusts, as well as to their selection, is requisite to insure satisfactory results from their use.

Crusts or scabs are, however, composed of varying proportions of lymph mixed with epidermis, debris, and perhaps pus, all of which is animal matter and liable to putrefactive changes, which may cause an unhealthy action in the party vaccinated ; and for this reason they are not recommended as the best form of preserving the vaccine lymph. Besides, a considerable portion of the crusts prove to be inert, and no amount of skill yet attained by experts enables them to distinguish always the good crusts from those which are worthless. Lymph preserved in glass tubes have been much employed. But experience with these demonstrates that it is an unreliable method of preservation, the lymph being immediately subject to change on exposure to the air. This method is almost fallen into complete disuse, though at one time quite popular.

The most approved method now practiced of preserving lymph is by collecting it from the vesicles at the period of their maturity upon thin lance-shaped pieces of ivory, upon which the lymph dries in a firm, thin layer. It is then wrapped carefully in cotton-wool, tissue-paper, and finally an outer covering of impervious gutta-percha, which effectually excludes air and moisture. Prepared in this manner, it has often been sent to the most distant countries without any deterioration of its active properties.

"PATENT SOLID LYMPH CONES"

is another form of vaccine virus found for sale by instrument dealers, druggists, etc. The statements made in the circular publishing the virtues of these "patent cones" are so much at variance with the real facts respecting them, as revealed by a careful examination of them, that it would seem to be within the lines of the legitimate and proper duty of the State Board of Health to openly caution the citizens of the State regarding their fraudulent and dangerous character.

The said circular, which *lies* before me, describes them as being "*consolidated lymph*," and as "*solid lymph made into a thick mass.*" These remarkable statements are alone sufficient to excite the suspicions of any one having any practical knowledge of the business of producing lymph. The writer is informed by experts that an amount of "consolidated, solid lymph," enough to make one of these cones could not be produced for more than one hundred times the price named in the advertisement. One gentleman, who is among the most eminent vaccinographers in this country, and who has been a large producer of animal vaccine, writes me, that, if every particle of the little tears of dried lymph which could be obtained from two hundred heifers could be carefully collected, it would not be enough to make one "solid cone" of the size which is advertised by the New England Vaccine Company to sell for three dollars. In the same veracious (?) circular, it is asserted that "these cones are entirely free from any trace of pus, debris, or epidermis," thus attempting to impress still more forcibly the previous statement that they are only "solid lymph."

The writer submitted for examination one of these cones to Dr. T. Mitchell Prudden, Director of the Physiological and Pathological Laboratory of the College of Physicians and Surgeons of New York, and Lecturer on Normal Histology in the Medical Department of Yale College. The following is a copy of his written report of his examination:

"NEW YORK, July 1, 1881.

"DEAR DOCTOR: I enclose the report of the examination of the cone of virus, and send you a slide for examination with a pocket glass of low power, which shows some of the hairs, &c., taken from the portion which I examined.

"Sincerely yours, T. MITCHELL PRUDDEN.

"TO DR. CHAS. A. LINDSLEY."

MICROSCOPICAL DRAWING FROM A SOLID LYMPH CONE, AS DESCRIBED.
a HAIRS, *b* PART OF A LEAF, *c* VEGETABLE FIBRES, *d* AMORPHOUS MATTERS.

THE REPORT.

"The mass consists largely of larger and smaller clusters of epithelial cells and cell detritus, together with a large number of hairs, some broken off and others torn out by the roots. Besides these things there are fragments of vegetable substances of various kinds. fibres, bits of seed, etc., shreds of connective tissue fibres, starch granules, and considerable colored amorphous material whose nature I am unable to determine. A few lymph cells and fragments of the same are also present.

"Quantitative results were not sought for; but from about half of the single cone I picked out seventy-four fragments of hair which were readily visible to the naked eye, and many more were left, which were readily seen by low powers of the microscope."

Such is the wretched mixture that the patentee offers to the public as "solid lymph." It seems to be constructed on the same idea that masons make mortar, to be held together with hair.

Any physician with an apprcciable sense of the dangers of septic poisoning would never venture to inoculate a patient with such a compound of animal and vegetable matter, liable at any moment, under favorable conditions, to take on putrefactive changes, which might render it fatally poisonous.

In the proceedings of thc Medical Society of the County of Kings, N. Y., for April, 1881, is an accouut of a death after using one of the cones obtaiued from the New England Vacciue Company, occurring to an officer in the U. S. Navy, and reported by the surgeon.

The following are extracts from the ship's medical journal:

"March 2d. Whittaker, Chief Engineer. Left arm very much inflamed from receut vaccination."

"March 3d. Whittaker, Chief Engineer. No fever; headache and lumbar pain much moderated; left arm very inflamed and painful; inflammation erysipelatous in appearance."

"March 4th. Whittaker, Chief Engineer. Not much constitutional disturbance; condition of arm no better; erysipelatous inflammation extends from elbow to shoulder; whole circumference of arm involvcd; surface of skin exteriorly covered with blebs."

"March 5th, 6th, and 7th. At home ashore."

"March 8th. Whittaker, Chief Engineer. Febris—sick leave."

"March 9th. Whittaker, Chief Engineer. Erysipelas. No im-

provement in the condition of the arm. He is under the care of Dr. S., of Brooklyn."

"March 10th. Whittaker, Chief Engineer. Erysipelas. Information was received this morning that Mr. Whittaker grew worse the early part of the evening, and died about 10 o'clock, P. M."

The above record leaves little doubt that the virus used in the vaccination was the cause of the erysipelas and death.

The surgeon making the report writes that "this is the only case of erysipelas or disease of any kind which he has observed from vaccination, . . but the Powhatan lying near us had one fatal case some weeks ago."

All the bad results of impure vaccination do not get into print. But it needs but very few such sad events as the above to maintain and intensify the popular prejudice against all vaccination, however prudently and scientifically done.

It is a very serious misfortune, that so good, so safe, and so essential a means of public safety should be questioned and doubted and its usefulness limited because it must share in the public mind all the odium and reproach which justly should attach only to the imperfect, deceptive, spurious, and injurious kinds of vaccination. Yet such will continue to be the fact so long as it is popularly believed that old women, druggists, midwives, clergymen, schoolmasters, etc., are competent to properly perform the operation and pronounce upon its results. Such will continue to be the fact, so long as the intense commercial competition in the production of cheap virus attracts venal-minded and mercenary men of every grade of capacity who may think it presents a chance for money-making. Such will continue to be the fact, too, so long as *physicians* culpably neglect to fully inform themselves as to the source and quality of the virus which they use upon their patients, and trust to druggists, instrument-makers, and traders of every sort, who, through their facilities for advertising, can offer them virus at the cheapest rates.

The evils resulting from vaccination are, in the present light of science, almost wholly avoidable. With scarcely an exception, every unfortunate result from vaccination may be justly attributable to ignorance or inexpertness on the part of the vaccinator or a culpable carelessness in the selection of the virus.

Besides the dangers which may follow the use of poisonous virus, there is a far greater mortality resulting to persons who contract small-pox, while living in supposed security, on account

of their vaccinations having been spurious and imperfect. "What is called vaccination," says Dr. Elisha Harris, "is, in a vast number of persons in the United States, only so in name, and not in reality." As Mr. Marson has said concerning vaccination in England, so in the United States: "All persons, amateurs, druggists, old women, midwives, etc., are allowed to vaccinate in any way they may think proper, and the persons operated on are considered to have been vaccinated."

It will probably be a long time before public intelligence will attain to so high a standard as to tolerate the interference of the state or of sanitary authorities with the rights of private citizens to be vaccinated in any manner, and by any one, or with anything, that said citizens may select, and to pay for it and take whatever consequences may ensue. But as the eminent English sanitarian Mr. Simon says: "No principle can be more obvious than this; that if the state professes to vaccinate the people, above all, if it compels the people to be vaccinated, it must take every possible security for the excellence of the vaccination which it offers."

The subject is one of such momentous importance to the public welfare, that it is worthy of profound attention. The wide-spread prevalence at this time of small-pox in every direction throughout the whole country will give occasion for a vast deal of vaccinating and re-vaccinating.

Is it practicable to restrict the use of the vaccine virus, with which the market is flooded by irresponsible producers, by providing on the part of the state, to all qualified practitioners, a sufficient supply of a quality reliable, safe, and trust-worthy, obtained under such official supervision as would insure such quality, and sold at so low a rate as to destroy any competition, while at the same time it should be so carefully produced as to be entitled to the fullest confidence?

Dr. W. M. Welch, physician to the Municipal Small-Pox Hospital of Philadelphia, Pa., speaks as follows, on this point: "For better protection against a pestilential disease which is constantly recurring, and which is frequently most destructive to business and commerce, the propagation of animal lymph of perfect quality is of so great importance to the public that it should not be left solely to private enterprise, nor degraded to the level of a commercial trade, but should be under the control of the national or state government, so that lymph of undoubted good quality could always be obtained free of cost."

WHAT ARE THE EVIDENCES OF A SUCCESSFUL VACCINATION?

As has already been observed, large numbers of persons are vaccinated only in name and not in reality. It is therefore a matter of much importance to know confidently and reliably in which list a person rightfully belongs, that he may govern himself accordingly.

In the early days of vaccination the test was, subsequent inoculation with the small-pox. In Jenner's time the protective efficacy of vaccination was very frequently tested in that way. Within two or three years after Jenner announced his discovery, he reported that upwards of six thousand persons had been inoculated with the virus of cow-pox conveyed through a succession of human subjects, and the far greater part of them have since been inoculated with that of small-pox, and exposed to its infection in every rational way that could be devised, without effect."

Such a test proved beyond question the protective power of vaccination. That fact is no longer in dispute. No fact in medical science is more firmly established. It is in these days, therefore, only needful to know that one has been the subject of a genuine vaccination to know that he is thereby protected.

Vaccination produces a specific disease, *vaccinia*, with diagnostic indications so well marked that an expert does not mistake them. The beginning, progress and termination of the inflammation excited by the inoculation of a person with the virus of cow-pox is so characteristic, when it is undisturbed in its natural course, that it is unlike any other, and can be recognized and identified as a vaccination by an intelligent person of good powers of observation, who has had frequent opportunities of seeing true vaccinations. But without such opportunities, or without the ability to improve them, the diagnosis cannot be made. Such an one has no hesitation in pronouncing every sore arm, following his punctures or his scratches, a successful vaccination, whatever condition it may present, whether spurious or genuine. Not infrequently the sore upon the arm arising from the insertion of worthless virus is even more severe than that resulting from the genuine lymph. Hence the dangerous error of entrusting an operation, the success of which one's life may afterwards depend upon, to an unskilled and incompetent person, who cannot distiuguish between a common or an erysipelatous inflammation and the specific indications of vaccinia which result from the inoculation of vaccine virus, and which only afford safety from small-pox.

It would serve no good purpose, and is not within the intended scope of this paper. to describe at length and minutely the diagnostic marks of true *vaccinia*. The object is rather to impress upon the reader the serious fact, that vaccination is an *event* of weighty significance, the influence of which is of such consequence that a large portion and perhaps the whole of his life will be affected by it. The simplicity of the operation, and the inconsiderable illness which usually succeeds it, should not blind any one to the fact, that it is an event of deep concern to every individual. It is *not* the trivial thing which many regard it. to be ignorantly or negligently performed and with uncertain effect.

HOW OFTEN SHOULD VACCINATION BE REPEATED?

The subject of re-vaccination is one upon which much difference of opinion exists in regard to some minor questions. But upon the importance of it, and the use of it, as a general rule of practice, there is great unanimity of opinion.

Why is re-vaccination necessary?

There are two essential causes for it; one is, because the primary vaccination was defective.

Jenner recognized this necessity, and he was accustomed to do what is altogether too much neglected now, that is, to watch the vaccinations throughout their entire course, and if any irregularity occurred, to advise re-vaccination immediately, or at some early convenient period; because he had already learned that such vaccinations were not fully protective and could not be depended upon as security against small-pox.

In these latter times, when negligence, ignorance, or defective lymph so frequently vitiate the results of vaccination, this cause for a re-vaccination is vastly more common than in its early history.

It is the more unfortunate that it is so because the primary vaccination, if it has taken, but taken *badly*, will often prevent the success of a re-vaccination. And so a child who has had only a spurious vaccination is only partially, if at all, protected from small-pox, and yet is prevented from securing the protection which a good primary vaccination would have afforded.

This is another and a very important reason why the primary vaccination, at least, should always be performed only by a competent and careful operator. An imperfect primary vaccination is a very great misfortune. Re-vaccination cannot be relied upon to

make good the defects of a primary vaccination, although it is the best means of remedying the evil which can be employed. Another defect of primary vaccination is due to the application of too minute a quantity of vaccine lymph, the operation being perfect in other regards.

Dr. Marson, who was for many years physician to the London Small-Pox Hospital, shows, by an "analysis of his cases, that the mortality in post-vaccinal small-pox bears a very distinct relation to the quality and amount of the vaccination as evidenced by the number and character of the vaccine scars. His analysis showed that, of patients with one cicatrix over 9 per cent. died, of those with two marks 6 per cent. died, with three about $3\frac{1}{2}$ per cent., and of those with four and more only about 1 per cent. It showed, also, that in cases with good cicatrices less than half the number died than died among patients with indifferent marks."

This evil is largely obviated by the recent method of vaccinating, which is by abrading a portion of the skin and applying the virus to the raw surface. This pretty uniformly secures the application of the lymph over as large an absorbing surface as would more than equal the two, three, or four punctures that used to be made in inserting the virus. So that a vaccination by the modern method is *generally* equivalent to three or four punctures by the old method. The other reason why re-vaccination is necessary is that experience has determined, beyond a doubt or question, that, in addition to those who are only partially protected by reason of irregular or spurious primary vaccination, there is another class of no inconsiderable numbers, who, notwithstanding perfect primary vaccinations, have gradually acquired a renewed susceptibility to the contagion of small-pox in greater or less degree. It is not possible to distinguish this class from those who still enjoy the full protection afforded by vaccination. If such discrimination could be made with assurance it would be necessary to re-vaccinate only such as needed it. But the impossibility of knowing which, in a vaccinated community of adults, are liable to the infection of small-pox and which are not, involves the necessity of giving the means of protection to all.

Re-vaccination, therefore, is a wise proceeding, on the part of grown-up people, as affording probable needed security to such as have had defective infantine vaccinations, and as affording an additional security even to the best vaccinated, as no individual can tell whether he may be one of the great majority who are

fully protected, or one of the small minority who are only partially so. Persons who have faint cicatrices with ill-defined characteristics need vaccinating more than those with good marks. Persons with one or two scars only need it more than those with three or four good ones.

AGE AT WHICH RE-VACCINATION SHOULD BE DONE.

Supposing the primary vaccination in infancy to have been unexceptional, the teachings of experience are, that the subject is safe until the period when the growth of the body is about being completed, the age of puberty. During this transition stage between youth and adult life, the changes in the system are attended in a small minority of persons with a partial loss of the protective power of vaccination, and that is a period beyond which a person possibly incurs some degree of risk if not re-vaccinated.

The importance of re-vaccination at this age is more urgent in proportion as the indications of a good primary vaccination are wanting. A good and sufficient primary vaccination is, as a rule, then fully protective until the age of twelve or fifteen years. The only circumstances under which an earlier repetition would be advisable are a known exposure to the infection of variola or the prevalence of an epidemic of the disease.

As to subsequent re-vaccinations, the weight of evidence is, that an adult re-vaccination with true bovine virus with positive vaccinal effect will be fully protective against small-pox for the remainder of life; or, as Dr. Martin says, the subject will be as insusceptible of small-pox as "if he or she had twice had that disease." This strong assertion it is certain cannot truthfully be made with the long-humanized virus. Its enfeebled protective power has been again and again demonstrated by the frequent occurrence of varioloid and even variola after adult re-vaccination with it.

The diversity of opinion respecting the needed frequency of re-vaccination is mostly due to not recognizing this difference in the protection afforded by the two kinds of virus.

When the Jennerian or long-humanized virus is employed (and it is only that which, until within ten years, we have had experience with). re-vaccinations should be made as often as every five to ten years, and especially whenever an epidemic of small-pox is prevailing. With true bovine virus a primary vaccination in infancy and a re-vaccination at puberty is all that is required.

THE AGE AT WHIeH PRIMARY VAeeINATION SHOULD BE PERFORMED.

This is a matter of mueh praetical interest.

If an infant has been exposed or is liable to be exposed to the infection of small-pox it should be vaceinated at onee, however young. There is the less objection to vaeeinating infants of very tender age with the bovine virus, beeause there is no danger of erysipelas, whieh is the great dread when humanized virus is employed. But if there is no known risk of exposure the operation may safely be delayed until the age of three or four months, but not longer, because soon after this the period of aetive dentition begins, with its attendant irritations and frequent derangements. During this period vaeeination should not be attempted except for neeessity, beeause it might not take, or it might be rendered imperfect by the other disorders of the system, and thus impose upon the child the misfortune of an imperfeet primary vaecination. So that if not vaccinated before the time of teething, it is desirable to postpone it until after that proeess is mostly over. This waiting prolongs, by several weeks or months, the period of exposure, during whieh the ehild must be more elosely guarded, and cannot without some risk be taken even upon the street, or make journeys, or be earried in any publie plaees.

The importance of an early vaeeination is the more impressive when we remember that young ehildren have always been the most numerous victims of small-pox. The statisties of England show that one-fourth of all the fatal eases are of ehildren under one year of age.

CHILDREN SHOULD BE IN HEALTH WHEN VAeeINATED.

This rule does not necessarily exelude many ehildren who are sickly and feeble. Scrofula does not prevent the full development of vaeeinia, nor would the latter stages of ehronie whooping-cough forbid the operation, and so of some other chronie disorders, but aeute febrile diseases do always. Exeept under pressing necessity, skin affeetions, partieularly those of a vesicular form, as herpes, eezema, and intertrigo, should oecasion the postponement of the operation until they are eured.

A careful vaccinator will always examine if there be any uneruptive disorder upon his patient, such as often is found behind the ears, any chafing in the folds of the neck or in the groins, before he operates.

The trained observing powers of Jenner early detected the interfering influence of cutaneous diseases, and he described how they prevented the full and correct reception of the vaccine influence. His rule of practice was "to sweep away *all* eruptions from the skin previous to inserting the vaccine lymph."

The period of weaning is an unsuitable time for this operation, for obvious reasons. It should not be performed, except under the most pressing need, during epidemics of any of the severe diseases of children. Also, except for urgent cause, during the seasons of extremes of temperature it had better be postponed.

CONCLUSIONS.

1. That the vaccinia produced by the proper inoculation of vaccine virus protects the subject as much as an attack of small-pox.

2. That wherever compulsory laws are enforced, the protection afforded by vaccination is satisfactorily demonstrated.

3. That as between the two kinds of vaccine virus now in use, viz., the bovine and the humanized, the bovine is to be preferred. (*a*.) Because it is fully protective, while the humanized gradually loses its protective power by frequent transmissions through the human system. (*b*.) Because bovine is exempt from the risk of communicating other diseases than vaccinia, while the humanized virus is liable to produce erysipelas, and in rare instances has conveyed the poison of syphilis.

4. That the vast importance of this subject, as it concerns the public welfare, forces the inquiry: If the best interests of communities do not demand that a supply of genuine, trustworthy, bovine virus should be always provided by skilled producers, under the official direction of the state or national governments?

5. That a primary infantile vaccination with good bovine virus is fully protective until the age of puberty, and that a re-vaccination at or about that time, resulting in any perceptible vaccinal effect, will be protective through the remainder of life.

MALARIA IN CONNECTICUT.

BY

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MALARIA IN CONNECTICUT.

The problem of the causation of malaria,* notwithstanding the amount of time and thought that has been expended upon it, is not yet fully solved. In fact, one can hardly say that we know much more concerning the primal cause than is known concerning all fever poisons, that is, that they are particulate, minute particles of matter and insoluble, and probably either of vegetable or animal nature, but which is not so clear. The address of the president of the section on practical medicine† at the International Medical Congress of 1881, in touching upon this point, stated :

"Perhaps no more important step has been made in practical pathology than the proof that some, at least, of the contagia are organized solids. This discovery, which has tried the patience, experimental skill, and scientific criticism of the best observers to establish, has brought us at length within view of that which has been hitherto so mysterious. To have been able, though imperfectly, to separate the contagious particles, to have come to the conclusion that no fever poisons are soluble, is a hopeful preliminary towards forcing them to yield up the secret of their nature."

There had been a pretty general agreement on the particulate nature of the virus of yellow fever, growing out of the close study of that disease since the recent epidemics in this country, and the precise nature of the germ that produces splenic fever, the *bacillus anthracis*, has been demonstrated. The paper on vaccination in relation to chicken cholera and splenic fever, by Pasteur, read at the same Congress, is confirmatory of these views. The experiments of Lanzi and Terrigi, 1870 to '76, tended to prove that malarial fevers were produced by algæ spores, not of any one species, but of any sufficiently small to pass through the capillary vessels. Mitchell first asserted the idea that malaria was due to spores or germs in 1849, Salisbury,‡ of Ohio; in 1866, attributed the production of malarial fevers to the spores of one plant, a species of palmella which he called gemiasma. Klebs and Crudelli, in

*The term malaria is used in a general sense to include all diseases of which intermittent fever is a type.

†Sir William Gull.

‡ American Journal Medical Sciences, 1866.

1879, claimed to have found the germ that produces malarial fevers, which they named *bacillus malariæ.* This last claim is still *sub judice.* The experiments of Dr. Sternberg, under the auspices of the National Board of Health, were not wholly confirmatory. The germ theory, however, apparently best explains the recent manifestations of malaria in Connecticut. The same objections, however, to the paludal theory of Lancisi that have lately been urged as new, and derived from a study of the recent outbreak, have been urged repeatedly. The argument of the Roman Campagna in its favor is now lost, as it has recently been shown that as four-fifths of it are composed of hills rising gradually to the volcanic mountains of the Palatine system on the north, and of the Latian system on the south, malaria is as prevalent ou these hills as on the lower ground. But the theory of sub-soil moisture as an efficient factor in the production of malaria is confirmed, for from the lake basins formed by extinct craters in the above mountains there is a constant filtration to the low lands. The subterranean sheet of (ground) water is formed and descends to the river valleys, part of it remaining permanently imprisoned in the soil. Recently the vast system for the drainage of this region has been made out. The small tunnels heretofore supposed to be conduits for water, have been connected with a regular drainage system* for the removal of water from these hills. In this manner the development of malarial germs was prevented and the healthfulness of the region maintained. This is mentioned here as confirmatory of the view taken later, that thorough and systematic drainage, by which stagnation of the subsoil or ground water is prevented, is often an effectual means for the prevention of malaria. If the views of Klebs and Crudelli are true, and they seem to be meeting with increased favor in Europe, the following are essential conditions for the development of the bacillus malariæ: 1st, a temperature of about 20° centigrade;† 2d, a moderate degree of permanent humidity; 3d, the direct action of the air upon all parts of the mass. The literature of malaria also shows that hills, plateaus, and cliffs were as often, if not oftener, more severely affected than adjacent lowlands; the reason probably the same as in the case of the Roman Campagna, subsoil moisture. Indeed, it might almost be stated as a rule that those living near a marshy place are less affected than those living on high ground near by.

*London Practitioner, Oct., 1881.

†68° F.

The germs rise with the air and are swept to the hillsides which intercept them. Countless instances might be mentioned both from history and recent reports. Those in the convent three miles from Lake Agano, in Italy, and the marshes around the lake, are more affected than the intervening inhabitants on low ground, the convent standing on high land; the plain of Trappes near Versailles is affected from the distant marshes of St. Cyr, apparently; the dwellers on the neighboring hillsides to the marshes of Erith about Kent are more influenced than the dwellers on the low grounds, and those on a high ridge at Northfleet more affected than those living on the borders of the marshes, some distance below.* Smyth's statistical table of Sicily states that 35 out of 76 towns and villages affected by malaria were on hills and declivities, and many at considerable distances from the marshy tracts that produce the disease. These facts and many similar ones that will be given in the history of the several towns of the state, may be explained in two ways: either the malaria was not due to the marshes at all, but to sub-soil moisture, or the germs were conveyed to the hillsides by the winds. In this connection the prevalence of malaria to the windward of lakes and ponds might be mentioned, as in one of the towns in this state, where the prevailing winds are southerly, malarial cases are much more protracted, frequent, and severe on the northern banks of the ponds.

Malaria has with justice been called the modern Proteus, varying in character as influenced by local conditions, temperature, place, and time; adopting any form that accommodates it to prevalent influences; mingling its characteristics with those of almost every human malady, and modifying their essential features. Position and environment do not bar its progress. It occupies alike noisome fen, reeking bog and marsh, valley or hillside—flourishing alike upon arid plains and deserts, nor disdaining the dry precincts of a granite-quarry perched high among the hills. Climate, while influencing its character, affords but little check to its progressive march. In this country, we find it as far north as Hudson's Bay, and as far south and to the east and west as the continent extends. Appearing and disappearing (thus far, from unknown reasons), and again re-appearing without any apparent cause, it is as elusive as the will-o'-the-wisp. In one place it is sporadic; in another, epidemic; again, endemic, or even almost

*MacCullough, page 113, 1829.

pandemic. Yet the places may furnish precisely the same local conditions, and, indeed, may be adjacent to each other.

No form of disease has more strongly-marked characteristics of its own than this—restricting the term to those of which ague or intermittent fever is the type; and yet it lays down, one by one, each essential feature in its successive alliances with other forms, from simple neuralgia through the whole list. It spares neither old nor young, but attacks alike the new-born babe and white-haired age. Neither race, condition, sex, nor occupation are taken into account, nor is the form or character of its onset the same. Now it appears as a frank intermittent; now influencing the endemic fever of the region as typho-malarial fever; now obscurely in neuralgias and dumb ague. Again, its appearance is foreshadowed by its modifying influence upon other diseases, and the strangely-increased value of anti-periodics. Yet doubtless the problem is not unsolvable. Enough already is known of the disease to render it probable that it possesses fixed characteristics and unchangeable laws and a definite causation, if they could only be learned. I do not expect to contribute anything towards the solution of this problem except a series of carefully-collected facts, and as complete a history of the manifestations of the disease in one State as the time at my disposal has permitted, and claiming the right to change my theories as soon as facts warrant. This paves the way for a more detailed local and topographical study to follow.

In order to complete as far as possible the work outlined, we have had a special study of the Housatonic valley and the south-western part of the State made by an expert (General Viele), in order that all sides of the question might be presented, and also to obtain a better general idea of the topography of that region, whose special importance will be seen later. The New Haven region and the one alluded to just now possess in certain portions many of the characteristics noted by La Roche as favorable to the production of malaria:

"A geological formation of tertiary and cretacious secondary deposit, with argillaceous and rich alluvial soil more or less impervious to water, or where, whatever may be the nature of the soil, water is found at a short distance from the surface, or where the latter is dotted with marshy fields and traversed by sluggish streams or by swampy, low, flat, level lands, or by level plains, ravines, or deep valleys, either dried or drying upon the surface after having been thoroughly wet, containing a large amount of organic remains." *

* Thus admitting the influence of ground water. La Roche, pp. 128-9.

A brief resume of the various theories that have been advanced, or, rather, of the more prominent ones, may be of value. Before commencing the discussion, I would premise that Connecticut has long had a well-deserved reputation as an unusually healthy State, nor has the recent outbreak of malaria greatly increased the sickness and death-rate. In fact, the first effect has often been to diminish the death-rate, as malarial diseases often exist for some time before appearing to any extent in the death-returns.

Lancisi, in 1695, first called attention to the exhalations of low, wet marshes, and, soon after, these were associated with vegetable decomposition. This theory has lasted long, and has had the most numerous adherents. The strongest objection is, that the alleged causes do not produce the same results uniformly, and that the disease appears where the cause is absent.

Dr. Wadsworth, of Illinois, thus remarks concerning this theory:

"To one who may have passed a season in one of our Western prairies just being settled, where a large portion of the surface of a deep valley was overturned, and a little later saw almost the entire population lying with malarial fever as flat as the prairie sod, would certainly be pardoned if he stated that there was cause and effect, especially if he knew this same country to be a healthy one, sought after by hundreds of Eastern invalids, who passed over these prairies, sleeping out unprotected from the night air upon the undisturbed sod in all weathers, in search of health, which they most invariably found."

This theory is well stated by Dr. Younge, of Fort Wayne, Ind.:

"The action of a specific albuminoid principle, the product of decayed vegetable matter, appears to be essential to the production of malaria. This enters the system as a malarial gas; the poison acts upon the ganglionic system and on the blood corpuscles, causing vaso motor irritation, followed by vaso motor paralysis; it alters the character of the blood and produces congestion of the spleen."

The analysis of the air of malarious swamps shows only watery vapor and carbonic acid gas, with slight admixture of sulphuretted and carburetted hydrogen, pure hydrogen and ammonia, none of which have any relation to the production of periodic fevers, or at least no proven relation.

The cryptogamic theory was first advanced by Prof. J. R. Mitchell in 1849. He ascribed periodic fevers to minute poisonous fungi in the atmosphere (carried about by the winds) which enter the system through the organs of respiration. In

1866, Salisbury published the results of his experiments by which he was led to believe malaria to be due to the spores of a species of palmella which he called gemiasma. This theory received considerable attention until Prof. H. C. Wood, Jr., showed that the palmellæ could not live in the human body, were found in non-malarious regions, and in his experiments did not produce malaria in whatever way they entered the system. Similar results, each from different spores, have been proclaimed by Horton* in the malarial regions of Jaffa Elkund, surgeon of the Royal Swedish Marine, Bolestra of Rome, Lanzi and Terrigi, and lastly Klebs and Crudelli. The germ theory, as before stated, is gaining ground, and investigation of the *bacillus malariæ* is the order of the day. Bolestra, already mentioned, attributed the cause to a granular microphyte which he found in marsh water accompanied by a considerable number of small spores of a greenish yellow color, also by sporangia or vesicles containing spores. This plant in contact with air grows rapidly, disengaging small gas bubbles. The spores were, he thought, the cause of miasm. Abekan attributes malaria to an "excess of ozone" (St. Louis Clinical Record, Sept., '79). Laveran asserts the cause to be parasitic pigmentary elements, or melaniferous lencocytes, which he describes and illustrates.† Niemeyer attributes it to low vegetable organisms whose development is chiefly due to the putrefaction of vegetable substances. Liebig associates it with the deoxidizing caused by putrefactive decay. It has been asserted that the germs that produce malaria exist always in the air, certain meteorological influences bringing them into activity. A modification of this view is that the conditions that give them activity are found within the body, the germs introduced being multiplied. Barker teaches that an organic poison comes into contact with decomposing matters in the soil, acts as a ferment, producing compounds which when breathed become poisonous.‡ It is even asserted that there are as many malarial poisons as there are specific forms. It has been, however, quite generally agreed that the poison, to be reproduced, requires the presence of decaying organic matter as the marsh miasm theory has received a very general acceptance. The thermal theory of Oldham is worthy of mention, from his experience in India. He attributed malaria to the debilitating

*Diseases of tropical climates.

†Laveran Impaludisme, Paris, 1881.

‡Barker, Malaria and Miasmata.

influence of long-continued heat or the sudden absorption of heat following sudden changes of temperature, heat without these sudden alternations being powerless.* Reber modified this by attributing it to the effect of heat upon the "temperature centers of the body, thermal paresis."† Dr. J. W. Penn states "the remote cause to be enervation from privation of electricity caused by the evaporation of water." (Trans. Medical Society, Tenn., 1879, p. 68.) The three last are readily rejected for Connecticut, as several of the others, without discussion. They possess some interest as indications of the directions thought upon this subject has taken, and the range of study.

There has been, however, a more general agreement upon the conditions associated, more or less uniformly, with malaria. The best summary I have found is that of Dr. Loomis:

"1. A certain amount of vegetable matter, either on the surface or in the substance of the soil where the malarial poison is generated. It is not necessary that the amount be large. A certain amount is necessary.

"2. A certain amount of moisture must be on the surface or in the substance of the soil; it need not be excessive, but some is indispensable.

"2. A certain average degree of temperature is necessary for its production. It cannot be developed below an average temperature of 58° F. for the twenty-four hours, and will not prevail as an epidemic unless the average temperature ranges as high as 65° F. for the twenty-four hours.

"4. Marshes are especially favorable to the development of this poison, but all marshes are not malarial. The power to generate malarial poison varies with the amount of water they contain. When there is abundance of water malarial fevers are rare; when the marshes are covered only by a thin sheet of water, and exposed to the direct rays of the sun, malarial poisons will abound. Marshes that are dried up are especially favorable to the development of the poison. Yet, as soon as the heavy rains submerge the previously parched surface, the power to generate the poison is for a time diminished or entirely arrested."

The experience at New Britain illustrates this rule. They drained a marshy pond in early summer and exposed its bed to the sun's rays; there was such a prevalence of malarial fever in the vicinity that they were obliged to flood it again until late in the fall, when it was drained and graded. The mill-ponds in Stam-

*Oldham: What is Malaria? Calcutta.

†St. Louis, 1879. Thermal Paresis, so-called malaria.

ford were drawn down, and nearly every family in the vicinity had malaria. Yet it is doubtful if this alone would have caused malaria had it not existed there before, for the same result did not follow the drawing down of the ponds in Union, nor the drying up of ponds and streams in hundreds of other places in the State. The admixture of sea-water with fresh is considered by Neimeyer and others as peculiarly injurious, as many fresh-water and marine plants die and decompose. Yet, when the tide-gates were carried away at West river in New Haven, and a hundred acres or more were flooded and so covered that the turf all died and many trees were destroyed—indeed, hundreds of dead trunks are still standing in that region—no unusual amount of malarial fevers followed. Vegetation has now nearly re-covered the meadows, but the only result was a slight increase in the frequency of malarial fevers. It is true their severity and duration were increased, and they have been endemic ever since to that region. Marshes resting on sand are far less malarial, and those in high latitudes generate no malaria, even if dry in summer, because the temperature at night falls below 50° F.

1. "Damp bottom lands, subject to annual overflow, are fruitful in the generation of malarial poison." Experience in this State shows that such lands are exceedingly influential in causing malarial diseases to become endemic when once introduced, especially if they are uneven, so that water lingers in spots. Numberless instances of this have occurred in the valley of the Farmington, Connecticut, Housatonic, and other rivers, but similar lands in the eastern part of the State have not yet succeeded in producing malaria.

2. "The upheaval of new alluvial soil when new lands are brought into cultivation; railroad excavations made which bring decomposing vegetable matters to the surface, which, under the influence of heat and moisture, generate malaria." The same objection exists as before, but where malarial disease exists already these conditions may favor their spread and frequency as well as severity. The appearance of malarial diseases in Hartford in 1871, on the completion of the Valley railroad, and along its course, is given in confirmation of this statement. Extensive disturbances occurred in the city about the same time; grading on a large scale, opening new streets, and a large trunk sewer. Other instances might be adduced, but such disturbances account for but a small percentage of the territory invaded, if for any at all, as the disease was in the valley before the railroad was commenced.

3. "Water flowing from malarial districts may bring malarial poison to non-malarial districts." There is no fact better established in the history of the present epidemic than this, that it has followed rivers and streams even to their springs, and extended along the coast line from west to east. It may follow a river either with its current or in the opposite direction, and in the former case often proceeds *per saltum*, that is, omits certain places to which it afterwards slowly extends.

4. "Non-malarial regions may be infected by the wind. It may carry the poison up mountains from 600 to 1,000 feet. Montfacon asserts that malaria never reaches perpendicularly more than five hundred yards."*

In fine, nearly all writers admit wet soil, marshy land, and decaying organic substances as factors in producing malaria. A long catalogue of authors might be here cited, including nearly all the standard writers on medicine and hygiene. As stagnant water is one essential factor generally agreed upon, systematic drainage is a logical deduction as one of the surest means of prevention. Indeed, countless instances might be adduced in support of this view. The most striking is that of Detroit, which from one of the unhealthiest cities, where a peculiar congestive-malarial fever was epidemic, with a large mortality, is now one of the healthiest cities in the world, and as free from epidemic diseases as any, due largely to systematic drainage. The reclamation of large areas in Michigan and its redemption from malaria furnishes nearly as striking examples. Maryland furnishes nearly equal examples, and in our own State several towns are beginning to feel the effects of similar enterprise. Of course this can only be carried out when either surface or subsoil water requires removal, but the frequency of the stagnation of the latter has already been noted when not usually suspected. This is in accord with the latest development of the bacterial theory, for a certain amount of moisture is an indispensable condition for the development of the bacillus malariæ.

The manifestations of malaria in Connecticut and in New England generally disprove the necessity of marshes or vegetable decomposition for the production of malarial poison, however they may favor its continuance.

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*The recent accounts from Colorado disprove this assertion completely.

HISTORICAL SKETCH.

Intermittent fever appeared in New England during the first century of its settlement. The first indigenous cases were located in and about New Haven, Conn., in 1671, according to Josselyn. Hubbard's History of New England (1677 or 1678) also mentions the fact. These authorities are quoted by Holmes.* The cases of the Rev. John Sherman, of Eliot, the famous apostle to the Indians, and others, are related as occurring in Watertown, Mass. The New England States lie within the latitudes affected in the old world with ague, and the mean annual temperature is higher than that required for its production—except, perhaps, some parts of Maine. McCullough† states this to be 45°, while the average of Rhode Island—very similar to Connecticut—is 47° Dr. Bronson gives the evidence of Rev. John Davenport with reference to its prevalence in Fairfield aud Norwalk as well as New Haven, and states that there is good reason to believe that the towns along the sound, including New London, were affected during the seventeenth century.‡ In 1725,§ malaria prevailed in Litchfield, near a dam on the Bantam river, which gave rise to some litigation ; but the details are meagre and obscure. The dam was removed in 1730, and soon after malarial diseases disappeared; but no more rapidly than in other places where there were no such supposed causes.

An account is given of an endemic fever in Bethlehem, in 1750, following the draining of a pond; but its subsequent flowing, some time after, gave rise apparently to another epidemic—of a different disease, however. From 1796 to 1799 malaria prevailed in New Milford, and suit was brought against the owner of a dam in an adjacent town for maintaining a nuisance. The verdict of the jury, after hearing considerable evidence, was in favor of the owner of the dam; they could not find that the dam was proved a nuisance. It was claimed that the raising of the waters by mill-dams in Salisbury, Colebrook, Roxbury, and in various places in other states, had been followed by fevers of the same type as that at New Milford. Many physicians from the neighboring region were called upon in this case.†† On the other hand, it was shown that there were many cases in New Milford in 1796, *before the dam*

* Boylston Prize Essay, 1836 ; Intermittent Fever.

† On Malaria, Phil., 1829.

‡ On Intermittent Fever, etc., Conn. Med. Soc. Trans., 1872.

§ Dr. Barrows on Intermittent Fever in New England Pro., Conn. Med. Society, 1877.

†† Memoirs, Conn. Acad. of the Arts and Sciences, Vol. I ; New Haven, 1810.

was raised, and that the fever had existed in many preceding years from 1782. In 1757 a malignant fever, as it was then called, raged, and the fever-and-ague had always been a disease of New Milford; that the towns through which the Housatonic river runs have been frequently visited with bilious fevers, and that too where no mill-dams could be resorted to as the causes. It was proved that the same disease had prevailed in this and other states, on the most elevated hills, and in situations heretofore deemed the most healthy. This is quoted so fully because it shows the existence of malaria as an indigenous disease of the Housatonic valley at times and in places not otherwise mentioned. Dr. Holmes also mentions Pomfret, in Windham county, as invaded by ague. With this exception, the present eastern boundary of ague is the same as in colonial times. I have also had reported to me the existence of malaria in Enfield in 1780—its history carefully traced by Dr. Parsons.

Dr. Knight, of New Haven, it is said, used to state that malarial diseases had never wholly disappeared from the limestone regions of the lower Housatonic, and the more we learn of the detailed history of malaria in that region the more correct does this statement seem. Indeed, there are no long links to bridge over now, as will appear more plainly later. There were many towns in Massachusetts where malarial fever existed at this time, but the only interest in this connection is to show the northern limits of the disease, which reached Northampton in 1793–4. Sheffield, Greenfield, Deerfield, and Hatfield were about this time, or soon after, invaded. In 1796 there was a very marked prevalence in Sheffield, Mass., described by Dr. Buel. He also states that the disease existed in the upper valley of the Housatonic, sporadically, from 1796 until 1820, and since. In some years many cases occurred; in others, few or none. In 1811, malarial diseases reappeared in Greenwich, continuing several years; in Salisbury in 1818–9, with sporadic cases until 1825, when malarial fevers in epidemic form existed along a belt near the shore five miles wide from near the New York line to the Housatonic river, which, however, it did not cross—continuing, some years more, some less, until 1832, with sporadic cases, when it re-appeared in Salisbury, lasting several years. It re-appeared in New London county in 1837, lasting until 1843. There were then a few cases each year. A death from intermittent fever is reported, in 1850,* from Fair-

* The first registration report is 1848. Diseases not reported.

field county, and one from bilious remittent. Two other cases of the second form are reported in the state: one also in 1852. The returns for 1851 are not available. In 1853 there were four deaths from intermittent fever: one in Fairfield county, two in Litchfield, and one in Middlesex. 1854, none, but four from remittent, and deaths also in other counties. The next death reported is in 1861, but not until 1862 is a death reported from New Haven county. In 1865, two in Fairfield county; in 1866, four deaths; in 1867–8, two each year; in 1869, three.

These items are only given to aid in proving malarial diseases to have been permanently endemic in the region in question, which also includes portions of Litchfield county. There were sporadic cases in Guilford from 1852 to 1878, and, commencing near the New York line in 1852, it extended along the sound. From 1850 to 1856 there were cases in nearly all the shore towns through which the railroad passes, commencing during or after its construction; it reached Bridgeport either in the fall of 1861 or the spring of 1862. There was a local epidemic at Black Rock in the fall of 1861, and in the intervening region towards Bridgeport. In Sharon, sporadic cases existed from 1856 until the outbreak of the recent epidemic. There were cases in Stamford in 1845, and probably some years after. Dr. Hurlbutt stated that it had prevailed there more or less since 1850, hence it in all probability did not entirely disappear. In Stratford there were cases in 1821, in Norwalk in 1780, and 1825 it was epidemic. In Milford is ap-it appeared in 1841.

In 1850 it appeared in the New Haven region near Beaver Ponds, with more or less cases every year until 1864, when there was an epidemic in West Haven, and a more extensive one in 1865, when it reached Wallingford, invaded, so to speak, the valley of the Quinnipiac and Connecticut, and, singularly enough, attacked that portion of the valley of the Connecticut lying in this state at both ends, appearing in Enfield in 1866, although there were but a few cases. There were also sporadic cases in Essex and Glastonbury in 1861, and in Portland in 1868. From 1865 the spread over the New Haven region was very rapid. Each year saw new territory invaded. In 1867 it had extended four miles northward and advanced each year. The most extensive epidemics in New Haven city were in 1870–71. The years of most rapid diffusion, 1871–72 and 1875. The valley of the Connecticut was fully occupied in 1878, that is, in this state. In

Massachusetts it had reached Springfield in 1870, Holyoke 1875, Northampton 1879, and Pittsfield 1880. Intermittent fever has originated up to the close of 1880 in 14 towns in Berkshire County, most prevalent in Sheffield, Great Barrington, and Lénox; in 8 in Hampden County, most prevalent in Holyoke, Chicopee, and Springfield; in 9 towns in Hampshire County, especially in Northampton; some cases in three other counties, with sporadic cases in four others.

Malarial diseases now occupy about three-fourths of this state, bounded east by the Thames River. Windham County is thus far almost entirely exempt, also a large part of New London and Tolland Counties, but it is difficult to say how long this may continue, as malarial diseases have appeared extensively in Providence, R. I., during the present year, thus affording a new focus from which to spread; and several towns report deaths from typho-malarial fever.

There has been a decrease in the frequency of malarial cases in their older haunts, as in the New Haven region, valley of the Quinnipiac, East Hartford, and Hartford, with perhaps an increase in the severity of the cases for the last few years previous to the fall of 1880. Commencing from that time there has been a renewed increase, not general but very marked in some regions, so much so that they are justly reported as epidemic, but not in every portion of the old territory. As a rule the cases are massed in the river valleys, along the shore, and near water on low flooded bottom lands, but there are also as many proportionate instances as in the previous history of the disease, where high and apparently dry regions are especially affected. Details are given in the local histories. There have been several towns from which malarial diseases have been reported since the fall of 1880 that were before free.

The following table shows the date of the appearance of malarial diseases in each town; not of sporadic cases, but the date from the commencement of its prevalence, for there were occasional cases in New Haven from 1850 until 1858, here and there, and in Orange in 1859, North Haven in 1865, and so in other towns.

DATE OF THE APPEARANCE OF MALARIAL DISEASES.

NEW HAVEN REGION.

Towns.	Date.	Towns.	Date.	Towns.	Date.
New Haven,	1864.	Orange,	1861.	East Haven,	1861.
Hamden,	1863.	North Haven,	1868.	Woodbridge,	1866.

SOUTHWESTERN WATERSHED AND SHORE TOWNS.

Greenwich,	1876.	Stamford,	1871.	New Canaan,	1870.
Darien,	1862.	Norwalk,	1868.	Wilton,	1870.
Ridgefield,	1875.	Redding,	1863.	Weston,	1869.
Westport,	1873.	Fairfield,	1860.	Easton,	1873.
Trumbull,	1873.	Bridgeport,	1861.	Stratford,	1871.
Milford,	1861.	Branford,	1867.	No. Branford,	1879.
Guilford,	1878.	Madison,	1876.	Killingworth,	1878.
Clinton,	1878.	Westbrook,	1875.		

VALLEY OF THE QUINNIPIAC.

Meriden,	1865.	Wallingford,	1865.	Cheshire,	1867.
Southington,	1871.	Prospect,	1876.	Bethany,	1877.

VALLEYS OF THE HOUSATONIC AND NAUGATUCK.

Huntington,	1871.	Salisbury,	1877.	North Canaan,	1877.
Seymour,	1872.	Monroe,	1877.	Derby,	1878.
Oxford,	1872.	Bethany,	1877.	Naugatuck,	1872.
Wolcott,	1875.	Newtown,	1877.	Southbury,	1876.
Bethel,	1865.	Waterbury,	1876.	Danbury,	1862.
Bridgewater,	1878.	New Fairfield,	1878.	Brookfield,	1877.
Woodbury,	1875.	New Milford,	1874.	Roxbury,	1875.
Plymouth,	1862.	Watertown,	1879.	Thomaston,	1875.
Kent,	1877.	Harwinton,	1879.	Sharon,	1876.
Cornwall,	1879.	Warren,	1880.	Torrington,	1875.
Winchester,	1880.	Norfolk,	1878.	Canaan,	1878.

VALLEY OF THE CONNECTICUT.

So. Windsor,	1875.	Suffield,	1877.	Enfield,	1866.
Somers,	1877.	Ellington,	1877.	Broad Brook,	1873.
Windsor Locks,	1878.	East Windsor,	1873.	Warehouse Pt.	1873.
Windsor,	1875.	Poquonnock,	1876.	Bloomfield,	1875.
West Hartford,	1873.	Hartford,	1872.	East Hartford,	1872.
So. Manchester,	1874.	N. Manchst'r,	1878.	New Britain,	1872.

Wethersfield,	1864.	Newington,	1871.	Glastonbury,	1871.
S. Glastonbury,	1871.	Burlington,	1874.	Berlin,	1871.
Cromwell,	1870.	Middletown,	1870.	Portland,	1870.
Chatham,	1875.	E. Hampton,	1877.	Durham,	1874.
Middlefield,	1874.	Haddam,	1872.	Chester,	1875.
East Haddam,	1873.	Hebron,	1879.	Colchester,	1868.
Marlborough,	1878.	Lyme,	1876.	Saybrook,	1876.
Essex,	1871.	Old Lyme,	1877.	Old Saybrook,	1873.
Rocky Hill,	1872.				

CONNECTICUT RIVER SYSTEM—VALLEY OF THE FARMINGTON.

Hartland,	1879.	Granby,	1878.	Barkhamsted,	1870.
New Hartford,	1879.	Canton,	1870.	East Granby,	1876.
Burlington,	1874.	Bristol,	1875.	Simsbury,	1878.
Tariffville,	1879.	Avon,	1875.	Farmington,	1875.
Unionville,	1876.	Plainville,	1873.		

EASTERN BOUNDARY LINE.

Stafford,	1880.	Montville,	1879.	Norwich,	1881.
Eastford,*	1881.	Staf'd Springs,	1879.	East Lyme,	1876.
Coventry,	1877.	Thompson,	1881.	Lebanon,	1878.
Columbia,	1877.	Mansfield,	1880.	Waterford,	1878.
Bozrah,	1875.	Windham,	1880.	New London,	1880.

Taking the list along there were also sporadic cases in Westport and Hebron in 1870, in Clinton in 1876. At still longer intervals were the sporadic cases in Sharon and Enfield in 1856, in East Windsor in 1850, in Greenwich, Essex, and Hartford in 1861. As will be noticed, these places are often widely separated. In Berlin there was a case or two in 1867. The cases in Cromwell and Portland in 1868 have already been mentioned, and those in Middletown in 1869. Taking up the scattered dates, we find that intermittent fever, although not endemic generally in Connecticut, was present in some part of the state, mainly the western and southern, nearly if not quite every year since colonial times.

In 40 of the towns malarial fever appeared first upon the high land, not quite a third of the whole; in four of these upon the highest land in the place.

* One death from typho-malarial fever reported last year.

OUTLINE OF TOPOGRAPHY.

As has been stated, the eastern and western portions of the state are very hilly and mountainous; in the east, a continuation of the White mountains, of granitic formation, although there is little if any true granite in this state. Syenite, mica schist, and quartzose rocks abound. The western hills are continuations of the Green mountains, of limestone formation. Iron ore is found in this region. The highest peak in the state is Mt. Brace, in Salisbury, 2,300 feet high. There is considerable alluvial land; the rich bottom lands in the river valleys are mostly of this character. There are numerous trap ridges in the central portions of the state near the valley of the Connecticut, and in the New Haven region.

For purposes of this study, the state may be divided into the coast region and the river valleys. In the eastern part of the state, including all east of the Thames river, and the greater part of Tolland County, and almost all of Windham County, only a few cases in one or two towns at most can be found. The regions then are the New Haven region, valley of the Quinnipiac, valley of the Connecticut, and its tributaries, coast towns east of the Connecticut valley, the southwest drainage system and the valley of the Housatonic and its tributaries. The Farmington is included with the Connecticut, and the Naugatuck with the Housatonic. The shore towns have generally low, sandy beaches, more or less of salt meadow and marshy land along shore, and level plains with rolling to hilly ground to the northward, sometimes flat throughout, sometimes the hills extend to the shore.

The Housatonic and its tributaries occupy the western part of the state. The river rises in Massachusetts, the two branches that form it unite at Pittsfield. For thirty or forty miles above the falls at Canaan it flows through a rich alluvial valley from five to six miles wide. The fall is but very slight here, so the current is exceedingly sluggish. The river has from time to time occupied new channels, its course is serpentine as it cuts away here, and builds up there. It is subject to rapid changes and inundates large areas when swollen, especially in spring and fall. As can readily be seen, a dam sets the water back for a long distance and fills up creeks and coves. There are, however, but a few dams on the river, the longest is near Seymour, some 630 feet long. The valley, as a whole, alternates with long, level areas of varying width, and precipitous falls of the river with rough, hilly ground, the hills

coming near the river on either side. The Naugatuck resembles it in many respects, although the valley is not so wide and on the whole more hilly, and the scenery more picturesque generally. The hills oftener come close to the river, so that for long distances there is only room for the highway, or the hills have to be cut into for the road which often winds around elevated table-lands, the river flowing beneath.

The Quinnipiac flows through a sandy, gravelly soil with scarcely a swamp or marsh on its course until the salt marsh at its mouth, already described. Commencing with the manufacturing village of Quinnipiac on the borders of Wallingford, the dams are placed as thickly as the nature of the river will allow along its whole course, to its origin in the Southington hills, so that the water is set back from one dam to the other. The largest pond is at South Meriden, or Hanover, where the river receives its largest tributary, Harbor brook. The two ponds at Wallingford are about the same size. There have been no changes since malarial diseases appeared that might induce it, and the region is remarkably dry indeed. A large part of Wallingford is an arid, sandy plain. There is one large peat bog, notorious as the scene of the land slide of the New York & New Haven Railroad Company's track. This is usually covered with water, but adjacent is a large boggy swamp with stagnant pools. Harbor brook is as extensively dammed as the river, and in addition receives about two-thirds of the sewage of Meriden, to which the inhabitants of the villages below Meriden charge the causation of the fever and ague, which is nearly as prevalent throughout the valley of the Quinnipiac as in the New Haven region. It appeared, however, as a direct extension of the disease from that region. South of North Haven are many brick yards for two miles, with many shallow basins made by the removal of clay. West of the river there are several acres of standing water and low, wet land in North Haven, which the tide does not reach. The tributaries of the Quinnipiac are dammed as thickly as the main stream.

The valley of the Connecticut is generally low and level, the hills remote from the river, the soil alluvial, with large sandy plains in the southern portions. It is constantly wearing away in some portions to build up others. Below Middletown are the Narrows, where the river broke through, as it is supposed, upon the elevation of the trap ridges near Meriden. The river here flows between rocky banks, the scenery resembling somewhat that

of the highlands on the Hudson. The former character is soon resumed, however, and wide, flat plains mark the lower valley.

The Farmington, its principal tributary, has very low banks generally, and runs a very erratic course. It rises in the northern part of the State, runs south to Farmington, about one-fourth across the State, doubles upon itself and runs north half way back to the border of the State with an easterly bend, makes a deep southerly curve,* then runs southeast until it reaches the Connecticut. Its banks are, for the most part, exceedingly low and the meadows overflowed in spring and fall. At Tariffville, it runs through a deep ravine with wild and beautiful scenery. It is upon these bottom lands of both these rivers that malarial fevers are most prevalent and first appear, as a rule; and here they are most persistent and oftenest recur.

THE NEW HAVEN REGION.

This region will first be described. The topography is from Prof. Dana,† condensed. This region extends twelve miles inland from the sound, is about four miles wide in the southern part and seven at the northern limit. The eastern boundaries are sandstone and trap ridges, the western the Woodbridge plateau and the Orange hills, northern the Mount Carmel range, 800 feet high in some places. Near the western boundary is West Rock, a trap range from 400 to 500 feet high, terminating precipitously. Three to four miles east runs the Quinnipiac sandstone ridge, dividing that river and Mill river, ending in a bold, isolated peak called East Rock. This is trap rock, 380 feet high. A little north of a line connecting West and East rocks are two short trap ridges. On the eastern margin of this region is the broad valley of the Quinnipiac. This is a sluggish river, its bed but 4½ feet above sea level. The tide flows nine miles up its valley, flooding a large tract of low meadow more than a mile wide at the sea, narrower above. Pile-driving showed the mud to be 40 feet deep in some places. From one-third of a mile to a mile west is the Mill river, rising in Cheshire. Near its mouth are many acres of salt meadow. The ebbing tide leaves these bare with blue mud two miles from the harbor. It is a bright, clear stream, with clean margins. Within six miles the water has been dammed, and there are, from this point, six dams and ponds formed in several places. Still farther west, in the middle of the New Haven region, is the Ham-

* See drainage map.
† Trans. Conn. Academy of Arts and Sciences, Vol. II, Part I.

den plain, a continuation of that on which the city of New Haven stands. It is a sandy plain of little elevation. West of the center of this plain are Beaver ponds, one and one-half miles from south to north, one-fourth mile wide, now more properly a swamp or morass, through which a small, never-failing stream flows. On the western margin of the city of New Haven is West river, a sluggish stream. West is the low and sandy plain on which West Haven is situated. At the mouth of the river are large tracts of salt meadow and tide mud. North the soil is higher, but clayey and wet. On the western border of the New Haven region flows Cove river, with a wide margin of salt marsh at its mouth. There are here four small streams, each with extensive salt meadows, which drain this region. There is good reason to believe, I have learned, that this whole region is alluvial, the delta of the Connecticut, which, upon the upheaval of the trap ranges at Meriden and vicinity, broke through the heights at Middletown and formed its present channel. There was formerly a canal through New Haven, now occupied by the Consolidated railroad. To a great extent, this region is a sandy plain, with a warm, light soil and little organic matter.

The outline of the history of intermittent fever before given shows that it was indigenous here in the sixteenth and seventeenth centuries. There were occasional cases from 1800 to 1810; but from then until 1850 it apparently entirely disappeared, as there are no traces to be found, either in the mortality returns nor in reported cases in medical societies, or otherwise. In October, 1850, Dr. Daggett reported the first case of domestic origin near Beaver ponds. Sporadic cases were reported, increasing in frequency until 1861. At this time, the first item of local interest connected with the history is reported by Dr. Bronson,* to whom I am indebted for the history of this region prior to 1873.

On Cove river a dam was built in 1860, flooding fifty acres. The stumps of trees were left to rot in the water, with the usual turf and other growth. The first case was that of the man who tended the saw-mill near this pond, his house being close to the mill. The water was drawn off, so that repairs could be made in the flume. His family were attacked in 1861, and then it appeared in quick succession in all the immediate region, the number of cases varying from year to year In the not very thickly-settled region

*Intermittent fever in the New Haven region. Proceedings Conn. Medical Society, 1872.

within a mile and a half there were seventy cases in 1864. The next year it became still more general. Those before seized were again affected and new territory was invaded. The region has since continued malarious.

The extensive eastern part of West Haven escaped until 1870, in which year there was a very severe drought, unparalleled in that region for many years. During this year there were many cases, and still more in 1871.

In 1861, the New Haven Water Company completed their reservoir for supplying New Haven with water from Mill river. They built a dam thirty-five feet high at Whitneyville, the new dam taking the place of an old one eight feet high. A deep, narrow pond, two miles long, was formed, called Lake Whitney. Several acres, mostly at the upper end of the lake, covered with stumps, bushes, etc., were flowed, the high banks preventing much spreading elsewhere. In 1863, the first case occurred in Hamden of regular intermittent. About the same time two cases occurred in a house three-fourths of a mile west. There was one more case that year. In 1865, which was a very dry year, the first epidemic appeared.

In 1867 the disease had extended to Mt. Carmel,* four miles west of the north end of the lake passing through three manufacturing villages, each with one mill-pond, some with two; these had long remained at the same height. In 1869, a very dry year, fever and ague was more common than ever, and extended half a mile west of its former limits. During this year the water company raised their dam four feet, making it thirty-nine feet high; fifty acres of swamp land was flooded, fed mainly by its watershed. In 1870, as has been before stated, the drought was unprecedented, the water in the lake sunk lower than ever before, and eighty acres or more, including the recently flooded swamp, was exposed to the torrid rays of the sun. In 1870, at Whitneyville, seventy-one cases occurred among twenty-five to thirty families. In a village about all but two out of sixty-five factory hands had the chills. In Hamden,* in a population of 3,028, competent judges stated that 2,000 were attacked by ague in 1870. To supply the city with water another large reservoir was drawn down as if to add to the evils already existing. In 1871 it was nearly as rife, and extended up the Northampton railroad as far as Southington.

The disease first became epidemic to the north of Beaver Pond,

* See map. It is a station on the New Haven & Northampton R. R., which runs north.

in 1865. In the next year it visited every house for a mile and a half north, and was about as general in other directions.

The manifestations in the remainder of the New Haven region were similar to those already described; there were no very peculiar features. In the city of New Haven it was limited to the north-western portions, towards Westville and Beaver Ponds, from 1864 until 1870, more or less cases every year. In that year it suddenly became epidemic over the greater part of the city, all the maritime portions east of the Hartford railroad, nearly all the center, and other parts. The next year it covered all the territory invaded in 1870, and a great deal more—scarcely any portion escaped—and covered about the same territory in 1872, and made but small advances.

This prevalence, from 1870 to '72, was charged to the carrying out of extensive sewerage works, the disturbance of the streets in grading and paving. To this view Dr. Bronson dissents, and finds no evidence connecting the two. Indeed, 1871 and '72 were years of its greatest prevalence generally wherever it had appeared, and during which it appeared in many places before exempt since colonial days, if indeed it had ever existed before. The following table of the relative mortality from malarial fevers and typhoid, in New Haven, indicates its prevalence pretty correctly.

	I.	T.		I.	T.		I.	T.
1873,	7	55	1876,	14	22	1879,	22	16
1874,	5	45	1877,	20	13	1880,	36	15
1875,	12	37	1878,	14	14			

The mortality in 1881 will probably exceed that of 1880. This is not an entirely exact criterion: the longer malarial diseases are endemic the greater the mortality in proportion to the number of cases. While for the last few years malarial diseases have not increased to any great extent in New Haven, the mortality has largely, the cases are more severe, and the powers of resistance are weakened. During the present fall, however, malarial diseases have been more frequent. The mortality from typhoid shows how marked an influence malarial diseases have exerted in decreasing the frequency of typhoid fever.

TOWNS IN THE NEW HAVEN REGION.

The subject can, from this point, be best treated by giving local histories of each town, as fully as may be; these have been gath-

ered mainly by correspondence. A series of questions was sent out, and contrary to the usual custom, almost always answered. These are printed elsewhere, so they need not be repeated here. I take this opportunity, however, to return my heartiest thanks to those that have thus assisted me. In some instances this has been supplemented by personal investigations and interviews for special points. This would have been carried out more extensively had time permitted.

While numerous authors have been consulted, I am especially under obligations to Dr. Holmes' Essay, and to the admirable papers of Dr. Bronson, and Dr. Barrows, in the proceedings of the Connecticut Medical Society.

The towns included are, New Haven, East Haven, North Haven, and parts of Woodbridge, and Orange, but in the local accounts the towns are not divided.

The following facts of interest in New Haven, since 1872, together with the statistical tables already used, were kindly given me by

Dr. C. A. Lindsley, New Haven. About 1875, a freshet carried away the tide gates at the mouth of West river, which forms the western boundary of the city. For the first time in the century the salt water inundated one or two square miles of fresh meadow, killing all vegetation, including large trees. The gates were not replaced for two or three years, during which time, and for some time longer, vegetation was almost wholly destroyed. Fresh vegetation is now growing again, and the meadow sod is nearly all renewed, here and there bare spots. When the gates were replaced and the water receded, large amounts of vegetable deposits were left. Many of the trunks of the trees then killed are still standing, singly and in groups. There was no epidemic of malarial fevers, the resultant of that overflow, yet we have here on a large scale one of the most favorable conditions for its development, according to writers, nor was the germ or particulate of malarial fever wanting in the region threatened. It is true that malarial fevers have been 'more frequent in that vicinity than in other parts of the city since the salt water inundation, but no epidemic followed. We have had in New Haven all types of malarial diseases, but lately there are more of the anomalous irregular forms. Enlarged spleens and congestive chills have not been lacking, though not abundant. The influence on the frequency of typhoid fever is shown by the table printed above. No part of the town has been entirely exempt, and all ages have suffered, the middle-aged most, also those of indoor occupation, and females more than males.

Westville. The first indigenous case was reported in 1854, related

by Dr. Levi Ives to the New Haven Medical Association.* A second was reported in 1861, and one also in 1864. But in 1865 it was epidemic, and especially so in 1867, visiting fifty-one out of fifty-eight houses near Blake's mill. In 1868 and '69 there were but few cases. In 1870 there was a renewed outbreak; north of the village there were no cases, although the marshy banks of the pond are worse than those in other regions where malaria prevailed. In 1871 there was a renewed outbreak, and the northern and western limits were reached. 1872 was a year of general prevalence, as was also 1876. Typhoid fever and phthisis have been rarely seen until the present year, 1881, when typhoid reappeared. Malarial diseases are decreasing.

Orange, Dr. Barnett. I have noticed that from the time of our fall rains till late spring, most of our malarial cases are at the foot and along the edges of two hill ranges, which extend for some distance through this town. During the warm months malaria is chiefly in the neighborhood of ponds and marshy ground. The prevalent forms are remittent, intermittent, typho-malarial, and many cases of dumb ague. Malarial diseases are increasing. During the present year, since January, I think 75 per cent. of the inhabitants of West Haven have been affected to a greater or less degree. No ages are exempt; I have had a case in an old man, aged 98, and in a new-born babe. Before the prevalence of malaria there was no disturbance to natural drainage by dams, except in one instance where a mill-pond had been formed in the course of a stream, but in a location where the banks were abrupt and there were no marshes. Within a few years this same stream has had another dam above, and two other streams in different locations have been interrupted as to their free and natural drainage, and malarial troubles are now common in these neighborhoods. They are also more frequent near to a trout pond that has been sunk below the natural bed of a sluggish stream whose banks are marshy. Whether these have influenced the frequency is of course not known. The three brooks in this section of the town are quite sluggish, with marshy banks for the most part. During a drouth an offensive mist, unsafe to breathe, arises from these marshes. We have had several cases of typho-malarial. In one case I found that an open cesspool was allowed to overflow into the marsh; when this was remedied the health of those living near was improved. Near the localities where typho-malarial fever prevailed, in a dry season a crust would form over the marshes, and the mist at night and mornings was very offensive. There have been cases of congestive chills and enlarged spleens, but the only fatal type has been typho-malarial fever.

Hamden, Dr. Swift. Intermittent fever first appeared in 1863, with typho-malarial cases simultaneously. The first were on low ground near the outlet of a pond of about 75 acres, which for two years previously had been overflowed from one inch to three feet deep. The overflowed land

* *Vide* Dr. Bronson, p. 22.

was swampy and covered with a growth of alders, willows and smaller bushes, with patches of boggy meadow. In 1868 the reservoir at Whitneyville was nearly covered by a floating green plant about a quarter of an inch in diameter with five or six short roots, which were not fixed; that is, the whole plant floated. Other ponds along the river are filling up with this aquatic vegetation. West of the stream towards the north, in 1865 the disease had extended about a mile from its starting point, and almost every family was attacked, while for the same distance west and south there were no cases, but from this point for three quarters of a mile south nearly all suffered more or less. East of the stream it extended north about a mile, sweeping through Augerville in 1866, a manufacturing village with a population of from 80 to 100. The next year it extended through Centerville, the next village a mile north, having a population of about 200. During 1868, '69 and '70 it had included Ivesville, two miles farther north, and since then has been the principal disease found both on low and high grounds. Typho-malarial fever has been very common, and the principal fatal type, enlarged spleens, by the score; tertian quotidian, and double quotidian, common. In some cases there were two chills in one day, three in the next, until fairly chinchonised. All diseases are complicated with malarial features, more or less. We had but little in 1880 until the new railroad bed commenced to be worked, when nearly all the laborers, and many inhabitants, were prostrated. The streams here are sluggish, and the beds of ponds exposed afternoons in the late summer and early fall months. All ages, sexes, classes and conditions have been affected, probably $\frac{59}{60}$ of the entire population. We have had, meanwhile, no deaths from consumption nor from typhoid fever.

North Haven, Dr. Goodyear. There were possibly a few isolated cases as early as 1865, but intermittent fever was not commonly prevalent until 1868. The first cases were invariably among those that resided in valleys, upon low ground near streams, ponds or marshes, and in those persons most exposed to early morning or night air. I have regarded climatic changes as the most important factor; low grounds, marshes and sluggish streams, as favoring conditions, having a strong influence in retaining ague when once introduced. I have noticed that there are fewer cases comparatively, during a season of long-continued drought, than occur immediately after rain follows such a season. In addition to the salt marshes, for several miles near the mouth of the Quinnipiac, which are more or less covered at high tide, there is a large tract of low meadow formerly dyked to keep out the tide-water, but for twenty years neglected, and so is alternately under water and exposed to the sun as the tide rises and falls. The brick-yards are each year, as they remove clay from new localities, leaving more extensive pits, which are filled with stagnant water. When the tide is out there is a distinct marshy smell all along the river, and at night as one approaches it a dense fog is encountered and a chilly sensation experienced.

The residents west of the river adjacent to Hamden were first attacked, next those in the eastern part of the valley, later those living back from the river. Each year it extended farther towards the east and north, following streams and marshes by preference, lingering tenaciously around ponds. Nearly all the residents of the valley have been affected, whole families were prostrated with it, while lung, the most prevalent of all diseases, is now diminishing in frequency and severity. Since its prevalence there has been but little typhoid fever. The fatal forms have been typho-malarial and pernicious intermittent. The changes of climate as influencing malaria have been mentioned. The disease is also of a migratory nature, working along the coast year by year, from the south and west, setting in at the mouths of streams and creeping inland as circumstances favor. The increased enterprise after the war—more soil was cultivated, more water power needed requiring new reservoirs, although there has been none of the latter in this town—have been, it may be, favoring conditions.

East Haven.—The first indigenous case of intermittent fever was near Morris Cove in 1866, and from then until 1872 there were more or less cases, but it was not as common as in other portions of the region. The prevalence near a small settlement was attributed to the drawing down of a natural pond, and a partial exposure of its bed ever since in dry seasons. Near the outlet of Lake Saltonstall, where there is a factory village, there was a large portion of the inhabitants affected; several of them had, however, been at work in a peat swamp. As nearly as I can learn the subsequent manifestations have been about the same as in the region, generally. Cerebro-spinal meningitis has, it would appear, become endemic here as it has to a great extent where malarial diseases have been prevalent for a long time. Malarial diseases are not increasing in frequency and are on the whole rather less frequent. The usual types have appeared, the deaths principally from typho-malarial.

Branford, Dr. Gaylord.—Intermittent fever first originated here in 1868 or the spring of 1869; I refer to the recent outbreak, not including the colonial period. As near as I can learn there was a swamp near the houses and a marshy pond which was alleged as a cause, but it was in the same condition that it had been previously for generations, nor have there been any changes by which natural drainage would be obstructed, or any dams constructed. The only local condition that has any apparent action in increasing the frequency of malarial cases is the flooding of a larger area of low land in the fall, and shutting off the water by tide-gates in the spring which are kept closed through the summer, and other low lands alternately flowed and uncovered day by day; near this region there have been more cases. The fatal cases have been typho-malarial, and that, with remittents and dumb ague, together with the usual irregular forms, have been the most frequent types—tertian ague was the first prevalent variety. All ages, from infants of two months old,

have been attacked and no portions of the town have escaped. One very noticeable fact is, that persons living near the shore have been especially exempt until within the last three years. Consumption has been very prevalent, markedly so among the Irish and Irish-American population. I have seen no marked effect on typhoid fever, but there was but little when I settled here in 1873. I do not think that typho-malarial fever is a continuation of the two fevers, but a fever of a decidedly remittent character in its early stages, soon developing into a continued fever with more or less typhoid symptoms.

Malarial diseases are not increasing; on the contrary, they have been about stationary for the last three years or more. With the exception of the region along the shore before referred to, no new territory has been occupied.

Dr. Zink gives a similar account, and also mentions fatal cases of congestive chills as having occurred in a few instances. The main features of the preceding account are corroborated.

North Branford, Dr. Smith.—The first cases were intermittent, followed closely by typho-malarial, and cases of the latter have proved fatal. The cases originated in 1879. No local causes are assigned, as there had been no changes. Malarial diseases were stated to be diminishing. The opinion was stated that when better known these diseases would be found not to differ essentially from types of disease that were generally prevalent in the state, the typhoid and bilious fevers especially. This view was presented by Dr. Campbell of Ga., recently, as may be seen by the report of the meeting of the American Public Health Association preceding.

Woodbridge.—This is a town occupying high altitudes to a great extent, from 300 to 450 feet above tide-water. The first cases in town were in 1866. The village is situated upon a plateau, principally, and the farm houses are scattered upon the hills and in the valleys. The first cases were in 1871, before mentioned as one of the years of extensive diffusion. Dr. Bronson gives us a reason for its extension among the high hills of Woodbridge, the fact that the inhabitants had business relations with the infected districts—were either there long enough to contract the disease, or else riding by night over the malarious plains on their return from the city. It was not until 1871 that the high hills were reached in the manner explained. Typhoid fever has not been driven out, but its frequency lessened. There has been little disease here of malarial origin, and scarcely a case at present, nor for several years. Since 1876 it has been a rare visitor, if indeed there have been any cases indigenous.

VALLEY OF THE QUINNIPIAC.

The lower portion of this valley is partly included in the New Haven region, and a few of the lower towns are given in that con-

nection. As before, a few other towns, whose positions claim to be doubtful, will be here included for convenience of description, as they are border towns, in some instances not very readily classified. The general features of the valley have been given. The valley is broad, generally level, and the lower portion of the bed of the river but four-and-a-half feet above sea level. The river is narrow and small, dotted with countless ponds. It is constant, scarcely ever entirely failing. We will commence at the southern portion:

Wallingford, Dr. Harrison and Dr. McGaughey.—The first case of intermittent fever originated here in 1865, two miles south of the center, in a village called Quinnipiac, in a family living in a basement near the west bank of the river. The house had previously been used as a factory. The dam across the river was about fifty yards north of it. There had been no cases for sixty years or more. The disease gradually extended east and north, its limits pretty clearly defined each year. From 1869 until 1873, inclusive, it was generally prevalent. From a careful study of ten years, Dr. McGaughey states that seven-tenths of the cases originated near the Quinnipiac river or Windemere lake. In fact, the larger number of the cases within the borough limits have been on the banks or in the immediate neighborhood of this lake, especially the east side. I can remember the occasion, although I cannot tell precisely whether it was in 1879 or 1880, when the inhabitants on the streets running parallel and near to the east side of this lake were affected with different forms of malarial disease—men, women, and children. Even the domestic animals did not entirely escape, for at this time two cats had intermittent fever, as I noticed in making my rounds. The farther removed from water-courses, the less malarial disease. I think one law is firmly established—it is at least in my mind—and that is, that malarial diseases follow streams, and that a river has a greater influence than a creek or brook, and so on. As the water expands into ponds or lakes the malarial area widens, especially in case of artificial ponds. In such places malarial cachecias are more readily developed, or, in other words, chronic malarial poisoning. Dumb ague succeeds the frank intermittent, tertian or quotidian, followed by all the irregular manifestations, with an occasional recurrence to the original type. Enlarged spleens, dyspepsia, and gastralgia, irregular bowels, occasionally dysenteric condition, perverted action of the nervous centers through malassimilation of food, dropsies, from derangement of the liver, mark different stages in the development of malarial cachecia. When our lake has been the lowest, and, from diminished depth of water, organic matter freely exposed to the sun, malarial diseases have invariably increased. This has occurred so often as to prove to me that the chief factors in the development of the malarial poison are moisture, heat, and organic matter.

I think malaria induces infantile debility—if, indeed, children do not inherit a malarial diathesis, it hinders healthy pre-natal development.

Malarial diseases are decreasing, upon the whole; but there is a decided increase in neuralgias and nervous diseases, hemicrania, and supra-orbital neuralgia. Dr. Harrison estimates that about one-half the population have been affected, and states that it has prevailed most extensively upon the sandy plains along the river, but not always. Sometimes it has seemed to prevail most upon the highest hills, but is not so persistent. The only fatal form has been typho-malarial. He has watched its steady spread over the whole territory from year to year—some years much more rapidly than others, and, of course, much more prevalent in some than in others—and is inclined to find an explanation in general rather than local causes. Both typhoid fever and consumption have decreased; the latter notably.

Yalesville.—This is included in the territory already described; but as it is desired to give as faithful a reflex of the current thought upon this subject, room is made here for the opinion, quite general among the inhabitants, that the pollution of the river, by sewage especially, has produced malaria in this village and town. The latest dams were built twenty-five years ago; the others date back seventy-five years; and but one, recently raised, since built. None in this village. It is stated by a very intelligent observer that no family has escaped, and that all ages are attacked, as all have suffered. It is stationary—neither increasing nor decreasing. The village is situated on a sandy plain. There is no wet land. Typhoid fever has decreased. The most prevalent type now is dumb ague—the fatal forms, intermittent and typho-malarial fevers.

Meriden, Dr. Davis.—My first case was in 1868, upon high ground towards Cheshire. From other accounts there were sporadic cases from 1865. Dr. Catlin reported one in 1867. The city of Meriden is at the head of the plain, which continues to this point with a continuous elevation; but the upper surface is rolling, and broken into hills until the Hanging Hills. so called, 995 feet high, are reached, a trap dike which marks the commencement of the divide between Hartford and the New Haven region, and its elevation is supposed to be the cause of the change of course of the Connecticut river. Mount Lamentation, on the east of Meriden, continues the water-shed. The water that falls down one slope of these hills finds its way into the Connecticut river; on the other side, into the Quinnipiac. Malarial diseases did not become general until 1871, when there was an epidemic at South Meriden. The dam was raised several feet, and as it was near the junction of Harbor Brook, the largest tributary the river receives, a large area of swampy land was flowed. A large proportion of the population suffered. From dry weather much of this newly-flooded land was laid bare, and there were many cases during that year. Since then it has prevailed, with varying intensity. Some years might be called epidemic years; in others

about so many cases each year, with no great variations. There has been less typhoid fever. All types have prevailed. Regular intermittent has been most frequent. There have been one or two fatal cases of congestive chills, and many more of typho-malarial fever. About half my patients have been from same type, usually in persons under thirty-three years of age. I know of no cause to produce it here. We have a sluggish, obstructed brook flowing through the city.

As to localities: laying the water pipes through West Main street, a few years since, was followed by an increase of malarial troubles on that street. The extensive changes made in grading an avenue recently were followed by cases of intermittent fever and typho-malarial, where no form had before been known. Malarial diseases are decreasing in the south and west parts of the town, increasing in the north and east parts.

Dr. Nickerson states that, previous to the appearance of the epidemic, there had been two summers of unusually long-continued heat, rendering the system peculiarly susceptible. The culminating point apparently was reached in 1875, and there has been less decided intermittent since and more chronic malaria. We have now typho-malarial, bilious pneumonia, low types of dysentery, persistent enlargement of liver and spleen, rheumatisms of a decidedly malarial form, and a peculiar spinal affection. The typhoid element, of late, has largely predominated.

Dr. Wilson states, in relation to the cases in South Meriden in 1870–71, that families living on the borders of the pond escaped for five years after this period. At first, there was scarcely any east of the railroad except above Brittania street. There were no adequate local conditions to determine its course. It followed the same north-easterly direction it has shown generally in the State, not spreading laterally much during the first few years. Considerable changes were made in the brook after ague had existed three years, yet there was no increase of malaria near. Its course and progress are totally unlike the form he was familiar with south and west. It is essentially a migratory form, advancing independently of winds, water systems, and terrestrial or industrial changes. It abolished typhoid fever for twelve years; now it reappears for the last two years. It has prevailed among all ages, and taken the place of nearly all other diseases in the northern and western parts of the town, but is now gradually decreasing.

Cheshire, Dr. Chamberlin.—Intermittent fever originated here in 1867. The first cases were on low ground near a slow stream. There have been but few cases of congestive chills, one case of double quotidian; the tertian is more common. Of late, more of the irregular malarial manifestations have been present, such as dumb ague, for instance. About ten years ago a shallow pond was formed in the west part of the town as a reservoir, covering several acres, average depth five feet, low and much of the bed exposed in the last of summer and early in the fall. There is reason

to believe, I think, that it intensified the malarial diseases in the neighborhood. There were no new agencies previous to its appearance to induce it. The sluggish stream of the old canal flows through West Cheshire. Near its banks there is more malarial influence and it is more persistent. All ages, from three weeks to eighty years, are affected. I saw one fatal case of congestive chill in a child who had had one or two attacks of intermittent. Through some mistake, it did not receive the medicine ordered. The third attack was congestive. The messenger did not find me, and the child was in deep coma when I saw it, and never rallied. Have had two or three cases where a condition of acute insanity took the place of the cold stage; one case where patient had to be forcibly restrained from striking his family and friends with an axe,—no possible history of alcoholism. There is no history of ague in the early settlement of the town. I have made careful and diligent search and inquiry of old inhabitants. Our village green is 264 feet above high-water at New Haven, determined by leveling from a known point on the Valley railroad.

Southington.—As nearly as I can learn, the first case of intermittent fever occurred here in 1871, and since then malarial diseases have become the prevalent type, with the usual infrequency of typhoid fever, until within a year past, when there was an increase in the number of cases quite marked. There were no changes in land or water to cause malaria. The head waters of the Quinnipiac are here and in the southern part of Farmington, south of the hills which form the divide between the Farmington valley and the Quinnipiac. The river and its four or five tributaries are dammed as extensively as the levels will permit. Plantsville is the principal village, and numerous small settlements dot the banks of the brooks and river at every available point for water power. Yet until 1871 malaria was unknown. There is no trace of its existence in colonial times. Yet now all ages are attacked, so that at times and some years the attendance of the men upon the factories and of the children at school is noticeably interfered with. This, however, is peculiar to the whole valley and many other parts of the State. There has been an increased prevalence in portions of the town during the last year. As in other towns, the death rate is not increased. Rather the reverse, as there is less mortality from other causes. The usual types prevail.

LOWER VALLEY OF THE NAUGATUCK.

This is properly included in the Housatonic system, as the Naugatuck is the largest tributary to that river. But as the towns included finish New Haven county, and are closely related to those just described, it is as well perhaps to consider them here. The towns included are Prospect, Wolcott, Waterbury, Naugatuck, Southbury, Oxford, Seymour, and Derby. The last four are, indeed,

as closely related to the Housatonic, on which they border. The New Haven region was *facile princeps* the starting place, but, beyond one can readily take any direction; for from 1871 it did not make much difference in the direction taken from New Haven, one was sure to find malaria. The general characters of this region are high hills, rough, rolling land, and low-lying valleys, each with a larger or smaller stream flowing through, dotted with villages and flourishing hamlets. The air is celebrated for its purity, clearness, and freshness. One would scarcely ever think of associating malaria with this region. Yet it is claimed to be more prevalent on the hills than in the valleys. As the river is approached, the ground becomes more level, and sloping plains, for the most part, mark the course of the river to its mouth. As you go back from the river, the surrounding hills grouped in high ranges follow the river down on both sides, and, as has before been stated, sometimes border the very banks, the road winding among their elevated plateaus. Sometimes, deeply wooded, they overhang the river, thus greatly adding to the beauty of the scenery. The narrow road has barely space through the rocky glens, and for two teams to pass for reaches of a mile or so, here and there, is out of the question; the one nearest the entrance must, perchance, back out. This, of course, seldom if ever happens. There is quite a large agricultural population, but most of the inhabitants work in metals, wood, rubber, wool, and the other fabrics. Like the Quinnipiac valley, this is characterized for its diversified industries.

Waterbury.—The first cases occurred here iu 1876, when it became very prevalent in the whole region. The same date is given for Southbury, Prospect, and Oxford. The first cases were intermittent and typho-malarial, close together. This is quite often the case iu the hill towns, that typho-malarial fever appears early, if not first, as though the first influence was felt by the endemic fever of the region. The first cases were on high ground on the hills, but it soon spread all over the town. Adults are generally affected, but not to any great extent. The most prevalent type is a mongrel malarial fever without any distinct intermissions or chills. I know of no changes in this vicinity that might have induced malaria. It has been attributed to the cuttings and embankments for the New England railroad; but, while that may have been efficient in inducing malarial diseases to persist in certain localities, its appearance throughout the region generally is uot thus

accounted for. There have been, since 1876, years of unusual frequency; but malarial diseases are now about stationary. They have become endemic, and there is here no new ground to attack. I do not think any influence has been exerted upon typhoid fever nor consumption. I have seen no cases of enlarged spleen nor congestive chills. In fact, malarial diseases have not been as frequent, persistent, and severe here as in other parts of the state. The chronic malarial poisoning developing into malarial cachecia we have not had, or scarcely, if at all. The valleys are low, and Oldham's theory of varying temperatures as a cause would have a fair field. No illustrations of it, however, appear to be drawn from this region.

Oxford, Seymour, and Southbury, Dr. Barnes.—The same history applies equally well to all this region, including Prospect and Wolcott. The other two are more rough and hilly, perhaps. The topography is well given in the general description of the region. In Oxford, the principal village lies in a long, narrow valley, with high hills on either side. This valley commences near Seymour and extends to Middlebury, and a rapid brook flows through it, which is easily swollen to a torrent and overflows its banks on to the flats spring and fall, and after a long, heavy rain. The first indigenous case in Oxford was June 10, 1872. The person had been always a resident. The house was located on a hill, 300 feet high, with a flat top, a hard, firm subsoil, which cropped out, here and there, to the surface. There were also several small, springy, marshy areas. The case commenced with severe chills, lasting more than an hour, followed by complete stupor, which lasted through the day. The chills were averted by quinine; but as she had never taken medicine before in her life she refused to continue, and died in July of a congestive chill. Singularly, her daughter died of congestive chills accompanying pneumonia, last year. In August, '72, there were a few cases in the northern part of the town, notably near the cut, and clay and hard-pan fill, of the New York and New England railroad, five miles north of the first location. The place is usually dry, but from the clay cut there was a constant ooze, making constant evaporation where there was but little before. I have had typho-malarial fever in this region since. Malarial diseases have been more or less prevalent since, culminating in 1879 and in this region. There is less so far this year. The cut is a long, very deep cut, and the fill long and high, over sixty feet. Drs. Johnson and Kendall, of Seymour, state that the first cases there were in the fall of 1872, and by 1876 it reached Southbury. By this it was generally prevalent in all this region. The valleys where there are swift-running streams suffered less than the hills. This is applicable generally to the whole region. In Oxford there have been but a few cases in the valley until you reach a point below the outlet of a large reservoir which floods a swamp. There are in this region several such reservoirs for storing water for manufacturing purposes below

the point mentioned, towards Seymour. There are but few exceptions to the disease among the people in that region.

From my observation, as my field includes both, I should judge that there were more malarial diseases in the valley of the Housatonic than in the valley of the Naugatuck. Dams on streams like the Housatonic and the Naugatuck, where the streams are rapid, pure water, the banks precipitous and borders hilly, with little or no intervale, are not, in my opinion, causes of malaria along the borders. This was one of the last locations in Oxford to be affected. The first cases occurred in the easterly part of the town, and on the hills before the valleys.

Southbury, South Britain, Dr. Miller.—The first cases were near the Housatonic river, gradually extending to the hills back from the river. The irregular types are more common. I have seen no fatal results from malarial diseases, and since their prevalence I have seen but little typhoid fever.

Derby, Dr. Pinney.—The first cases of intermittent fever occurred here in 1868, as nearly as I can fix the date, upon the highest ground in the town, extending slowly from Woodbridge, the next town east, where it had prevailed at least two years before reaching us. The cause of its appearance must have been some general one, as there had been no changes in drainage, the damming of streams, or in the habits of the people. The Housatonic river was dammed near here soon after malaria had appeared, but, in my opinion, did not aggravate the trouble. All ages have been attacked, but malarial diseases, which have prevailed very extensively, are now diminishing, and are very much less pronounced in type. I have had no cases of typhoid fever for several years, and there has not been much typho-malarial fever. I have seen no cases of congestive chills nor enlarged spleen. I think there has been less consumption. As in other parts of the state, 1871–2, 1876, and 1879 were years of very extensive prevalence; in fact, since the last date, there has been rather a steady decrease. The whole region was not fully invaded previous to 1876. There was not as much in 1877 and 1878, but a fresh start was taken in 1879. In 1881, cerebro-spinal meningitis was almost epidemic in Derby, Ansonia, and Birmingham, and prevalent in the region about.

Naugatuck, Dr. May.—I am not able to state when the first case occurred precisely. We are indebted to Mr. Henry C. Baldwin for the following interesting statement:

"I have lived the most of my life in this town, and never heard of any one having chills-and-fever here until 1865, when I came home from the war, and then I knew of none except in cases of returned soldiers. In 1872 or 1873 I began to hear more or less of cases of dumb ague and malaria, and since then both have been apparently on the increase in this locality. We have few cases of the real 'shaking ague,' but dumb ague is quite prevalent, but not to amount to an epidemic. I can see no reason for the existence of malaria in this town, as there are no swamps,

no stagnant water, in this immediate vicinity. The river that flows through here is a rapid stream. There is one thing I have thought of, viz.: Waterbury, only five miles above here, with twenty thousand inhabitants, practically uses this river as a depository of its filth, and that may poison the air some. About three miles west is what is known as Long Meadow reservoir, which covers, I should think, some three or four hundred acres. Nearly every season this is drawn down, leaving a large tract of decaying vegetable matter exposed to the sun."

Dr. May states that malarial diseases have increased greatly within a year, occurring equally among all classes and conditions. I have found three out of a family of four prostrated with the disease. The prevailing type is mainly tertian, with some quotidian. Typho-malarial has, in every instance, occurred near a large pond containing stagnant water, or near a large embankment on the New York & New England railroad, in a low, marshy district, with much stagnant water and decayed vegetable matter. I have seen no fatal cases. There has been one local cause that has existed during the last year: the water of the river has been diverted from its natural channel into canals for manufacturing purposes, leaving the river-bed dry and exposed to the sun's rays. Very offensive vapors are produced. Rain, followed by warm sunshine, has seemed to me to act as a cause in producing malaria. I have not noticed any decrease in the frequency of typhoid fever; but as I have resided here but two years, and came after malaria was fully established, I can hardly tell whether or no any such agency has been at work.

SOUTH-WESTERN WATERSHED.

This includes the region southwest of the Housatonic valley, and is separated from that by the divide as shown on the map running along the hills of Ridgefield, Danbury, Redding, Newtown, Monroe, Trumbull and the northern part of Stamford. New Canaan also belongs here; it has two principal systems, the valley of the Norotan river and that of a branch of the Norwalk river. This region is drained by a succession of small streams rising in the northerly hilly regions and broadening as they near the Sound. The Norwalk river is the largest; its head waters a pond or small lake in Ridgefield. Three streams unite to form the Saugatuck, the largest the Westport river. Mill river and Pequonnock river might also be mentioned.

The description of the lower valley of the Naugatuck answers very closely for this region, especially the hilly portions. The hills are high and the valleys deep and narrow usually, with here and there more or less extended plateaus. The limestones of the Housonic regions here change through a series of micaceous rocks, rich in minerals, to the granitic rocks of Ridgefield; feldspathic and

quartzose rocks intervene. The shore towns have been most infested with malaria, whieh decreases as you travel northward, and on the high hills but little is found; chronie malarial poisoning and malarial cachecia are unknown, as are enlarged spleens and congestive chills.

The towns included in this seetion are Stratford, Bridgeport, Fairfield, Westport, Norwalk, Darien, Stamford, Greenwich, New Canaan, Wilton, Weston, Easton, Trumbull, Redding, and Ridgefield.

Milford, Dr. Heady. The first cases of intermittent fever were on high grounds but near marshes. In 1841 there was a single ease on the Milford shore, upon a point ealled Witches' Point, whieh is mostly high ground with some low marshy ground in the vicinity. Now all this marshy ground has become salt meadow. Fifteen years after this, or a few years later perhaps, cases began to appear quite frequently, nearly all near low marshy ground, but for the last ten years in all places, more or less. There is no apparent decrease or increase in frequency at present. All ages are attacked. I have had cases in nursing children. Tertian and dumb ague have been the most common forms.

Stratford, Dr. Nooney. As near as I can learn, intermittent fever first appeared here in 1871 on high ground, about a quarter of a mile from a marsh. Malarial diseases are constantly increasing in frequency. There were but few cases in 1877; now they are very frequent. Those living near the low-lying salt meadows seem to be more exempt than those living far away. These meadows are nearly covered by the tide. Adults are more liable than children. Ague prevailed here in 1828, according to the old inhabitants, and eontinued until about 1832. Dumb ague and a mixed malarial fever are the more usual forms. There have been no cases of congestive chills. I have seen but a few cases of typho malarial fever. I have seen no effect in decreasing typhoid fever.

Bridgeport, Dr. Porter. In 1860 there were five or six cases at Black Roek, in Fairfield, three miles west. The next spring it had extended a mile and a half nearer to us, when there was quite an outbreak. That fall or next spring, that is, in 1861 or 2, there were eases in Bridgeport. Ten years later it had pushed on to Stratford, three miles east. The first eases of intermittent in this eity were between a long marsh and pond. There were no eauses at its first outbreak that could have indueed its appearance. Two or three years ago, in the northern part of the eity, an extensive dam was erected, followed by an epidemic almost of intermittent fever. Through all that seetion malaria eame on the same summer shortly after the dam and excavation eommeneed there.

Bridgeport, Dr. Wordin. The forms most prevalent here have been tertian, ague, regular intermittent, eongestive ehills, typho-malarial fever. The anomalous forms, hemicrania, neuralgias, dumb ague, malarial

poisoning and the like exceedingly numerous. Malarial diseases are not decreasing. There is less typho-malarial and more typhoid this fall. Heretofore there has been but little typhoid. There are certain localities markedly infested. These are in the vicinity of fresh water streams, and on all of these dams or culverts have been placed before their exit into the Sound. In the northern part of the city there are several ponds, which mark such localities. The upper part of Berkshire Mill pond to North Bridgeport Station is infested with malaria. The obstructed streams are sluggish in their flow and most of them affected by the tide.

There is evidence that malarial diseases prevailed here years ago. Bridgeport was included in the shore towns from New York to New London that were invaded early in the 18th century.

Fairfield. Intermittent fever first appeared here in 1828 in common with other shore towns west of the Housatonic river, remaining until 1832; reappeared in 1853, continuing several years. Sporadic cases, in 1860, and extensively prevalent at Black Rock, as stated by Dr. Porter. In 1861 traversed half the distance to Bridgeport, which it reached either in the fall of 1861 or spring of 1862. There was then a prevalence for several years, and then they were infrequent until 1877, when the disease reappeared and continued to increase until 1879. A systematic plan of drainage was then carried out, by which a large amount of stagnant water and several hundred acres of low meadow, before saturated with stagnant water, were thoroughly drained. The village is situated for the most part upon a plain and is densely shaded, so much so that it will probably be necessary to use the axe freely before perfect freedom from malaria can be secured. Since the drainage works described above, however, malarial diseases have steadily decreased both in frequency and severity. Since then there have been no fatal cases reported.

Westport, Dr. Powers. From the best information I can obtain I should say that there were cases of intermittent fever here fifty or sixty years ago. After 1855 until 1870 cases were rare in this vicinity; after that, and more particularly after 1873, malarial fevers became prevalent. They are more frequent now than then, and there have been more cases this year than in either of the two previous. They occur in about the following order as to frequency: Intermittent, remittent, typho-malarial, pernicious or congestive; also many cases of malarial poisoning. Children are attacked less often than adults, but occasionally have congestive chills. This town lies comparatively low. I see more cases near the streams and fresh water ponds than near tide water, and more on high ground, where there is a stratum of rock near the surface, preventing free drainage. It was very prevalent two or three years ago in the vicinity of a pond when the water was very low and much rotten vegetation exposed to the sun, which had long been covered with water. I have seen genuine cases of typhoid fever within thirty rods of malarial cases.

Norwalk, Dr. Lockwood. I have canvassed the history of malarial diseases in Norwalk quite thoroughly. I was born here in 1841, and my father, now living at 84 years of age, was born here in 1797, and has lived here nearly all his life. I am also acquainted with many old people, and can say that the disease was never considered endemic in this place, and in fact it has always been free from malarial affections, excepting when they have prevailed in epidemic form. The first epidemic was in 1780, the second in 1825, the third in 1853. It was then confined for a few years to the immediate vicinity of the N. Y. & N. H. Railroad, but afterwards extended on both sides and became more general. This malarial belt was described by Dr. Lynes as about five miles broad from the shore inland, and reaching from west of the state line to New Haven. All the shore towns included in this belt were affected by malaria at that time. In 1868-9 the next epidemic commenced, and has raged with great intensity up to the present time. I have seen but few congestive chills, but fever and ague, dumb ague, chronic malarial poisoning, and numberless other manifestations have been rife. It spares neither age, sex, nor condition; even the youngest children have it. Under this epidemic influence, overwork, exposure, excess, and swampy localities, all act as predisposing causes, *but no local causes alone will account for the presence of malaria here.* We are suffering with other localities from the general epidemic. Intermittent was the prevailing type from 1867 until 1872, when typho-malarial and remittent fevers began to prevail and have since become exceedingly frequent; most intense on low ground, but widespread over hilly country, even where not before known with particular severity during the past nine years. There has been no unusual disturbance of land or water. There have been a few cases of congestive chills and enlarged spleens. There have been no cases of typhoid since the commencement of the malarial epidemic.

Darien. The history of malaria here is similar to that of the region generally, as the town, in its main features, resembles those adjacent. So far as I can learn there have been no peculiar features of interest here. Malarial diseases have been more frequent some years than others. 1871, '76, and '79 were years of unusual severity as elsewhere. Malarial fevers prevailed here in 1857, as generally along the Sound, from New York to the Housatonic river. In 1862 they again became epidemic, since which time there has been more or less each year. The frequency at present cannot be said to be increasing, but rather the reverse. Mixed cases, the mongrel malarial fever, dumb ague, and many neuralgic and indefinite cases, termed with more or less propriety malarial, have been more frequent during the last three or four years than regular intermittents. There has been some typho-malarial fever and a few congestive chills. The greater number of cases have been in the lower levels, near swamps and marshes and near ponds. There has been one new dam

built, and was but one before; the beds of both ponds are exposed in summer.

Stamford, Dr. Geib. Stamford is situated near the level of tide water, and surrounding it on its south and east side is a very considerable area of low marshy ground. Some of this is covered by tide water, but the greater portion is saturated by the adjacent water. When malarial diseases first appeared some twenty-five years ago mostly in the form of intermittents, the greatest number were in the vicinity and in close proximity to the mill ponds, of which there are two, the upper situated nearly in the center of the village where the population is numerous. To my personal knowledge, within the last six years there have been a number of deaths from congestive chills and typho-malarial fever. Twenty-five per cent. of the cases presenting themselves are associated with enlarged spleen, malarial cachexia or chronic malarial poisoning. Many cases have been obstinate to treat, and require an entire change of climate to bring about a cure. Adults have the disease more frequently than children; still the attendance at school has been moderately diminished in consequence. During the past season, on account of the prolonged drought, the bottom of the ponds have been exposed for nearly three months. The effluvia arising from them has permeated the whole village, causing a marked increase of malarial disease. The lower is the receptacle for all refuse matter from the woolen mill. The organic matter from the washing of the wool adheres to the bottom, and the admixture with salt and fresh water is offensive to the eye and disgusting to the nostrils. During the past season a majority of the inhabitants of the village have had malaria in some form. Malarial diseases are steadily increasing, and have been for the last five years.

Stamford, Dr. Ayer. The first cases appeared in 1845. There were a number of cases near a mill pond. The stream emptying into this was very low, and the pond also; in fact, nearly dry. These diseases have been increasing in frequency for the last ten years. A large part of Stamford is on low ground, nearly surrounded by hills, also hills back from the shore. The present year there has been an unusual number of cases of typho-malarial fever, induced by the drought. The streams became very dry and the wells low. A late spring seems to be accompanied by an increase in the frequency of cases of malaria. The mill pond in the center of the village has been nearly dry this summer, and there has been an increase in the number of cases in and about the center of the village. Typhoid fever is seldom seen, and there is much less consumption than three years ago; forty years ago consumption was our most fatal disease. There is now and then a case, but nothing to compare with what it was at that time. Congestive chills are rare; typho-malarial fever common. Malaria affects all ages, from the nursing child to old age.

Greenwich, Dr. Holly. The disease is stated to have existed here in 1800; also in 1811. There have been isolated cases near ponds for 20 years. The present epidemic commenced five years ago. The first cases were tertian intermittent, usually upon low ground. A reservoir was built in 1880 by damming a ravine a mile long by 5 to 800 feet wide, it has apparently been a prolific source of malaria during the last summer, owing to the protracted dry weather. The water was not unhealthful, but the exposed bed gave off offensive odors, deleterious to those living in the neighborhood. The water is usually 12 feet, but fell 3½. It is fed by its watershed; height above tide-water, 250 feet. The disease has been easily controlled. High ground exempt. New territory is constantly encroached upon.

New Canaan, Dr. Brownson. Intermittent fever first originated here about 1870. The first cases were in persons that lived upon low grounds near streams. Its appearance was gradual from the towns bordering on the Sound. It was three years in reaching the village. It seemed to follow the streams, making a progress of about two miles a year. The old prescription books mark the limits quite precisely. Even more slowly was its travel to higher altitudes, but on it went, northward and inland by steady steps for years, until out of my jurisdiction. Most of the cases in the early visitation were of the tertian form, with distinct, well marked chill, followed by fever and sweating in the ordinary form. Gradually, up to the present time, the paroxysms have been less marked, especially less of a chill; also less of sweating. Fever, with a tendency to continued fevers, predominate, with increased difficulty in controlling them. I know of no local conditions about our ponds, dams, or streams that differ materially from the condition ten or even fifty years ago. When intermittent fever was well marked, for some time after its first appearance we had notably less of typhoid fever than formerly. We now are having a renewed activity. The same is true of consumption. It would also seem, from my observation, that the nests where most of the mischief is hatched are the ponds and streams, that the poison, whatever it is, is hindered in its course by trees, ridges, or buildings, or anything obstructive. A clear, straight street from a pond letting the trouble into almost every house, while streams, some little distance away, with trees or other obstructions between, will be much more exempt from the malarial influence. In general, the well-fed, well-to-do classes are less affected, while the hard laborers suffer most. I also think the desire for alcoholic stimulants and the use of them are increased greatly by the presence of malaria.

Wilton, Dr. Emery.—Intermittent fever first originated here in 1870, or about that time, and appeared upon as high land as there is in the town, at least in the inhabited portions, but there was swampy ground 40 or 50 rods distant. Malarial diseases have never been very prevalent, and I have never seen or known of a case of congestive chills nor of enlarged

spleen. There were a few cases of typho-malarial fever, which was the only fatal type. During my residence from '66 to '79, there was no important change made in regard to either land or water, no dams were built, except one for the South Norwalk water-works, but I could never learn that its erection had any appreciable effect upon the health of the inhabitants. The town is occupied by an agricultural community, and there have been no marked changes for many years. Regular intermittent was the prevailing type, and after its appearance typhoid fever was extremely rare. No effect was exerted on consumption.

Dr. Huntington. My residence extends through the last two years only, and my observations are confined to that period. The first cases I met there were in the valley of the Norwalk river, and the only cause I can assign for the prevalence of malaria in the valley was the low state of the river, from which its bed was often uncovered in summer, exposing large quantities of vegetable matter.

Malarial diseases have not prevailed extensively until within the present year, especially during August, September, and the first half of October, when for the first they extended to the higher lands, although not as frequent as in the valley near the river. All ages are attacked, but less cases among the very young; they are rapidly increasing. The Norwalk river is dammed repeatedly, but no new ones have been recently built except that for the reservoir for Norwalk and South Norwalk. Soon after the construction of this, malaria appeared in the immediate vicinity. Remittent fever and chronic malarial fever are common types, but I have seen no fatal cases of any variety.

Weston, Dr. Gorham. I found malarial diseases prevalent here five years ago when I settled here, although less so than at present. The type was more distinctly intermittent and the cases appeared more frequently on low ground near the Naugatuck river, which flows through the town. There have been many cases of regular intermittent, numerous ones of typho-malarial fever, and a few cases of congestive chills. The most frequent form, however, is an irregular, anomalous kind of disease more nearly allied to bilious remittent than anything else. The only fatal cases have been complicated typho-malarial fever. Malarial diseases affect all others; they have been increasing the last three or four years in frequency and severity. I know of no local conditions nor changes that could induce malaria or cause it to remain. There is much marshy land on either side of the river, which becomes quite dry in summer. The river and its tributaries are rapid streams, all the dams are on the Saugatuck, built many years ago, and the ponds thus formed are quite low much of the time during the summer months. In my experience young children and aged people are attacked much less frequently than those between the two extremes. Children of school age are perhaps less frequently the victims of malaria than older people. I think the attendance at schools has not beeu much affected by it. As nearly as I can learn, ma-

laria was entirely unknown in this town until within a comparatively recent period. Pure typhoid fever is very infrequent here, and has decreased very markedly since the prevalence of malaria. I cannot see that any influence has been exerted upon consumption in either direction.

Trumbull, Dr. Reid. The first cases that originated here were of the tertian type, in the fall of 1873 or '74, and were on the highest ground in Trumbull. There is a small, rapid stream within half a mile, and a small pond about a mile distant. I took considerable pains at the time to investigate, but could find no local causes to induce malaria to develop here; there were no changes of land or water from the conditions that had existed for many years. In fact the only ponds in the town are small mill ponds where the water is from four to eight feet deep, covering eight to ten acres each. Since 1874 malarial diseases have prevailed very generally, affecting all ages. There has been no marked change in their frequency for the last three years. The irregular forms have been lately the most prevalent, the only fatal type typho-malarial fever. The only local change recently has been the cutting and clearing of large areas of woodland. Since malarial diseases have become established typhoid fever has been obliterated.

Stepney, Dr. Hill. There is absolutely no cause to account for the extensive prevalence of malaria in this region, which has affected nearly every inhabitant. All the old theories about its causation have been badly damaged by the manifestations in the recent outbreak. There has not been a dam constructed for fifty years. Typhoid fever, which was very prevalent ten or twelve years ago, has steadily diminished in frequency, and I have not seen a case here in three years.

Easton. Malarial diseases first appeared here in 1872 or '73; there has been nothing peculiar in the history or manifestations. The town is rather sparsely settled with an agricultural population, and there were no local changes to invite intermittent fevers or induce their persistence. The mongrel malarial fever is the most frequent type; typho-malarial fever has been the only fatal type.

Ridgefield, Dr. Todd. Intermittent fever orginated here in 1874 or '75, the first cases were on high ground about 600 feet above the level of the Sound, near a pond, and those living on the west side of this pond for two years were alone attacked, then it extended to the east side, advancing a mile from the pond. This was very low for several summers; since it has been full there have been fewer cases. Wherever it has occurred in this town, with but one or two exceptions, it has been near a pond, marsh, or river, and at a very dry time. But what is very singular, during the excessive drought of the past year, there have been but few cases; I have known of but one, and that near the center. There has been considerable prevalence along the Norwalk river, in the eastern part of the town. There has never been a very extensive prevalence of

malarial diseases, none fatal, the only varieties regular intermittent and the irregular forms. There has been no typho-malarial fever.

Redding, Dr. Wakeman. The first cases here were in the fall of 1863, of intermitteut type, in persons living near the factory ponds on low ground. Now there is no locality in the town exempt from the disease, and it is gradually increasing in frequency. It exists in all parts of the town, upon the hills and in the valleys, but is more prevalent in the valleys and near ponds and streams. There have been no local changes to account for its origin and spread. Nearly one-half of all the sickness in the town is thus caused, and all ages and conditions are attacked alike. The streams are usually rapid and with few obstructions, and these have existed for many years. Typho-malarial fever and congestive chills have been the fatal forms.

VALLEY OF THE HOUSATONIC.

The general characteristics of this valley have already been given. The lower portion of the valley of the Naugatuck has already been described.

Huntington, Dr. Shelton.—The first cases originating here were in the summer of 1871, were intermittent, and regular tertian among persons living near the river on low ground ; there were also ponds in the vicinity. Since then malarial diseases have very generally prevailed, and all ages have been affected, but more particularly it has prevailed among the laboring classes, and among workmen who perform night labor. While it has apparently diminished the frequency of typhoid fever, it has exerted no influence upon consumption. Malarial diseases have been rather decreasing of late, although the past season has given many cases of the regular type. Congestive chills and typho-malarial fever have been the fatal varieties, regular intermittent the most prevalent; there have also been cases of quotidian ague. When there is less of the regular intermittent, there is an increase of typho-malarial fever. This fall, singularly enough, there has been a marked decrease of ague and a surprising increase of typhoid fever, before almost unknown since malaria prevailed, and unusual fatality, for typhoid fever attending it.

It may be necessary to give a brief topography of our town relation to malarial diseases. The population of Huntington is very unevenly distributed. About one-half is embraced in the village of Shelton, located directly opposite Birmingham, three miles east of Huntington center, on the west side of the Housatonic river, which village is the outgrowth of the Housatonic water power, furnished by the damming of the river. Previous to 1869, Shelton scarcely had a beginning, but as soon as the water power became an established fact, the village took on growth until now, in point of population, it is the larger part of the town. In the year 1870, the Housatonic Water Co. completed the construction of a dam

630 feet in length across the Housatonic river, together with a canal one mile in length, extending from the dam below. This work necessitated the moving of an immense quantity of earth never before disturbed. The completion of the dam was followed by a flooding of several hundred acres, composed of meadow and bush land. During the winter and spring, the river is high and the banks well flooded, but in the summer and early autumn, the stream is lower and a very large part of its banks are exposed with its decayed vegetable matter. It was particularly noted that our first malarial cases occurred almost simultaneously in families residing on the banks of the Housatonic lake during the first dry season following the completion of the dam, viz.,—the summer and autumn of 1871. From that time it spread throughout the village, gradually creeping up the hills, first southward, then westward, and finally northward, until it embraced our whole town and extended to those adjoining on the west and north. Though all parts of our town have suffered to a greater or less extent, still the percentage of cases compared with its population has been very much greater in Shelton than in other parts of the town. While we must necessarily recognize some unknown *predisposing cause*, we are here forced to believe that the disturbance of such vast amount of earth in the construction of the dam and its canals, together with the large area flooded, has become the *exciting cause* of the development of malaria in Huntington.

Monroe, Dr. Lyon.—An irregular type of intermittent fever appeared here in the summer of 1877. Dr. E. Beardsley states, that he had two or three cases then ; that was the year before I came here. The majority of the cases of pronounced intermittents have been among those living on low ground, and the greater proportion near those localities that have usually been considered favorable to malaria. There have been no local changes to induce malaria; the streams are rapid with little flowed land. There are a few shallow ponds, two to three feet deep, whose beds are exposed in summer and very offensive. The clearing up of the undergrowth and trees around streams, ponds, and marshes, I think favors the spread of malaria. This type of disease has become very prevalent, one-third of my cases are malarial, all ages are affected, they have taken the place of true typhoid entirely. There does not appear to be much increase in frequency, but the cases are becoming more regular in type. The fatal cases have been typho-malarial and a few congestive chills, intermittents, and the irregular varieties are the most common.

Newtown–Sandy Hook, Dr. W. C. Wile.—I never saw a case of malarial disease that originated in this town previous to 1877. That summer it will be remembered, was very unusually dry, and the bed of the Housatonic river was exposed to the sun over six weeks, for the most part; then we had a violent outbreak of chills and fever all along the banks of the river about an eighth of a mile from the river. The cases were violent and I had more cases of congestive chills that summer than I have

had ever since. In fact, it put me in mind of my experience with Break-bone fever in the Arkansas bottom in 1867-8. Since then it has spread over the whole town until no region is free. I have not had a case of typhoid fever since, have seen no effect upon consumption. The usual malarial types are prevalent typho-malarial aud mixed forms, the neuralgic cases are also very common. I should thiuk that malarial diseases were decreasing. At least a quarter of the inhabitants have been attacked.

Dr. Bennett. Intermittent fever appeared here about ten years ago. The first cases were near marshy ground and it has prevailed more extensively in such localities. Since then, malarial diseases have been very prevalent in both regular and irregular forms, affecting all classes aud ages but less frequent among children. There does not appear to be any increase in the frequency at present.

Danbury, Dr. Bennett.—Intermittent fever appeared here in 1862, immediately after the constructiou of the reservoir which was formed by constructing a dam across a gulch; since then malarial diseases have extended over the whole town until no locality is exempt, and prevailed extensively among all ages, modifyiug all other diseases, and are now increasing in frequency. Although I have known of no fatal cases, tertian ague has been the most common type. I cannot see that auy influence has been exerted upon typhoid fever. There is undoubtedly some cause to me unknown affecting the whole county, but very much intensified by local causes. Thus the reservoir I have named and deluging the streets with water have intensified malarial diseases here. I do not think that the construction of the New York and New England railroad has increased the frequency of malarial diseases at all. There have beeu no dams coustructed recently, but a sluggish stream flows through Danbury that has several dams which retain the filth and sewerage which the river receives.

Bethel, Dr. Benedict.—The first cases of intermittent fever originated here in 1865; the first case was in a patient living in a house upon high gravelly soil, but his room was damp and situated upon the ground floor. There were no ponds, marshes, or streams near, a small stream about a quarter of a mile away. Since then the various forms of malarial disease have become quite prevalent, usually of a mild type, the only fatal variety typho-malarial fever. Formerly tertian intermittent was the controlling type; now the mongrel malarial fever, having a marked tendency towards the continued type; the frequency is about the same with the variation in type just noted. We have no flooded lands except in time of freshet, when swamps of several hundred acres are submerged. Our reservoir for the supply of water, constructed about three years ago, flows about 35 acres. It is in an elevated location, more than a mile from the village. I learn that ague prevailed here 150 or 200 years ago, in the early days of the state. (It is a singular fact that malaria

appeared here and in Danbury in 1863–65, while nowhere in the region around earlier than 1877; 12 to 14 years later. This is worthy of more special study, as indeed are many local facts and incidents that are brought out in these reports.)

New Fairfield, Dr. Adams.—The first cases that originated here were of a remittent type in people living near the flats at the south end of Ball's pond during very low water in 1877 and '78. The pond itself is on a high hill. The natural outlet was dug lower to obtain the water for manufacturing purposes, allowing the flats at the south end to become bare. The vegetable refuse and water lilies decaying caused a very offensive odor. Since then all parts of the town have been affected; regular intermittent and remittent fevers have thus far been the prevalent types; the intermittent is increasing, and other diseases taking on more and more the periodic character. Thus far there have been no fatal cases and no typho-malarial fever, enlarged spleens, nor any evidences of chronic malarial poisoning. There were no other local conditions or changes that could have influenced the production or retention of malarial diseases in any manner.

Brookfield, Dr. Williams.—Intermittent fever, as nearly as can be ascertained, first was indigenous here in 1877, the cases occurring upon the hills. The dwellings are for the most part on high ground; the principal village is on a high plateau, and the hills generally are very high, the valleys correspondingly low. When I commenced practice here in 1833 I was told that ague had been prevalent 40 years previous. I saw no indications before 1877. There are no local conditions that have influenced its location here generally or in any portion of the town. In one or two instances typho-malarial fever was caused from neglected sink drains long covered, which were dug out and the polluted contents left near the houses. I have seen but one fatal case of congestive chills and but one or two others. Intermittent fever has slowly but steadily increased during the last three years. There are now about 30 cases annually in a population of 1,100; all ages from 2 to 80 are attacked. I have not noticed any influence upon the frequency of typhoid fever.

Bridgewater.—The first cases of intermittent fever in this town that originated here were in the autumn of 1876 or spring of 1877. It reached us from the south along the vallley of the Housatonic, and since then nearly all if not all of the inhabitants along the river have been attacked. The cases have been confined almost entirely to this valley, gradually extending back towards the hills, which have not yet been reached, however. The town is mostly on high land with very few swamps or marshes. There has been no general prevalence outside this valley, and it can hardly be said to have been epidemic there. It has extended for the most part up the valley to the north; the hills seem to prevent its spread to the east or west to any great extent.

New Milford, Dr. Couch.—There was one isolated case of malaria here in 1864, a man of middle age living on a hill side, no water near save a rapid brook, nor any swampy land, of which there is indeed not much in the town. From 1874 until the present intermittent fevers increased steadily. The first death was in 1879 from typho-malarial fever, and this has been the only fatal type. There have been one or two cases of congestive chills; malarial diseases, never very extensively prevalent, have been decreasing this fall very decidedly. I should not think more than two or three per cent. of the people had been affected. I know of no local conditions to induce prevalence in one part of the town more than another, unless as follows: There was a dam three miles north of the village that gave way and has not since been rebuilt. In one house near the outlet of the pond there were five cases, and nearly all living near had it; yet in other localities there was the same prevalence.

Roxbury, Dr. Downs.—The first cases of indigenous intermittent were in 1875 in the neighborhood of a shallow pond which overflows swampy land. Since then they have increased slowly; a few cases in almost every part of the town, but never very extensively prevalent. With the exception of the pond mentioned there are no local causes to induce malaria, and there have been no important local changes in any respect. The town is hilly, an agricultural population mostly, and is not very thickly peopled. If anything, malarial diseases are increasing, but not rapidly. There has not been much of the chronic malarial poisoning, no enlarged spleens and the like. Intermittent and remittent fevers are the usual forms, with more or less of the irregular neuralgias, and dumb ague, but more of the regular intermittent. There have been a few light cases in other parts of the town, but it has been some time since I have seen a distinct and regular case of intermittent fever. The region mentioned, where the cases of intermittent have been most frequent, does not come within my field of practice. There has not, however, been any very extensive prevalence at any time, but for several years more or less along or near the river. I do not learn of any fatal cases. There are many light cases which might perhaps be called malarial; these are mostly self treated.

Woodbury, Dr. Shove.—Intermittent fever became indigenous here in 1875, the first cases arising among people that lived on low ground near an extensive marsh which is flooded spring and autumn. Tertian ague has been the prevalent type, and since ague developed here its increase has been uniform each year, but much more marked during the last autumn and summer than in any preceding year. Woodbury is one of the oldest towns in the State, located mostly in the Pomperaug valley, through which flows the river of that name, emptying into the Housatonic at Bennett's bridge. The river flows about midway between the Housatonic and Naugatuck, and to the west is the valley of the Shepaug river, another tributary of the Housatonic. Malaria prevailed

along the Housatonic valley south of Woodbury for several years before it entered the valley of the Pomperaug, and commencing at Southbury it has followed the rivers to the borders of this town and has spread from both banks, east and west, back to the hills. During the last year there were probably thirty indigenous cases in the population of 2,148, about equally divided between adults and children. There have been no fatal cases of congestive chills, no typho-malarial fever nor chronic malaria. There have been but few cases of typhoid fever during the last ten years. There is no reason here for our malarial invasion, nor any causes to induce these diseases to remain, that have not always existed, and the northern valley is nearly free.

Litchfield, Dr. Deming.—There were a few cases in the portion of the town belonging to the Naugatuck valley and watershed very near the Harwinton line, in the fall of 1880. They were four and a half miles from the village of Litchfield and on land lying six hundred feet below the village. There have been no cases since, and Litchfield may now be said to be entirely free from malaria.

Northfield, Dr. Blake, Jr.—1879, the first case of intermittent fever originated here in 1880, I think none before that time, and there have been more cases this year than last, perhaps six cases in all. The cases have all been near a pond, which however has been there in essentially the same conditions for twenty-five years at least, except that about three years ago the dam was raised. Part of every year the water is quite low, but there is never any offensive smell. The cases are regular intermittent and bilious remittent; none of them have proved fatal. There have been no local changes nor unusual conditions to induce malaria. Just at present there are no cases.

Warren, Dr. Derrickson.—The first cases of intermittent fever known to originate in this town, were in the summer of 1880, on low ground. Diseases have been modified and obscure for two or three years in many cases and were lingering with a periodical recurrence which yielded to quinine, which remedy appeared to acquire new powers. The first cases were near Lake Waraumaug (see map) in the southern part of the town, a small sheet of water about five miles long with an average breath of three-quarters of a mile, and an average depth of twenty feet. The earlier cases were very severe, approaching very near the congestive type. The prevalent type, is tertian ague, but a few quotidian and even quartan, and unusually obsinate, the more irregular the variety, the greater the severity and obstinancy of the case. Typho-malarial fever appeared later, and has been more frequent this year, and most cases of sickness have been complicated with malaria; the irregular varieties are now the prevalent types, and mongrel malarial fever. On account of the successive dry seasons, the ponds, lakes, and streams have been low. Most of the cases have been around Lake Waraumaug, and on the streams that empty into this lake. The water of the lake has been low and has sometimes in the very shal-

low portions had an offensive smell. The people say that the water of the lake is "working." This is probably due to the developement of myriads of minute plants of *algae*, which, floating in patches, appear like the results of fermentation ; this is confined mostly to the south end of the pond. I should judge that malarial diseases were becoming less frequent. All ages have been attacked, from infancy to old age; as is generally the case, when malarial diseases prevail, typhoid fever decreases in frequency. I am not aware of any unusual causes, except perhaps the successive dry seasons. Near the center, a small pond was drawn off and the bed exposed to the sun and air. Whether that had any effect in changing the prevailing type of typho-malarial fever is a question worthy of consideration.

Kent, Dr. King.—Intermittent fever appeared here in 1877, near an old mill pond that had been drawn off, leaving a mass of vegetation that decomposed and emitted offensive odors, and near there cases have existed every year since, but by 1880 it had become scattered over the whole town, more or less; still there were a large number of cases in the vicinity of the river and especially a mile north of the village, above the dam; here also last year the water was very low, owing to the successive seasons of unusual dryness, and the supposable cause for the much greater proportionate number of cases, the offensive gases resulting from vegetable decomposition; but during the present year, there have been as many cases in localities where no such cause existed, nor apparently any cause except the "*perihelia of the planets.*" This is certainly a year of epidemics. There is without doubt something more than local causes at work in causing so wide-spread and general prevalence of malaria. The only dams on the river were built fifty years or more ago, and have never been raised since. Malarial diseases have been quite generally prevalent, affecting all ages.

Torrington, Dr. Wood. There have been occasional cases of intermittent fever and dumb ague since 1875. The first cases were generally on low ground, but there were a few on the highest hills. We have very little true malaria in unmistakable form. I sometimes think it doubtful if we have it at all, for our cases rarely have more than a chill or two after taking quinine, and I have never seen a single case that originated here, at all alike in severity or persistence, those which I see every little while, contracted elsewhere; adults alone have been attacked thus far. The indefinite cases of debility, the so-called malaria, is the only form frequently seen here, with slight rigors down the spine, wandering pains in the limbs, nausea, and sometimes diarrhœa (dumb ague); there have been no fatal cases. We have had water introduced here with the necessary flooding of land and laying of pipes, but that has had no appreciable influence upon the prevalence of malaria, as it has not increased at any faster ratio than it did before. Since the first cases, the increase has been steady in frequency and more marked in characteristics.

Cornwall, *Dr. Sanford.* The first indigeuous cases here were of tertian ague, in 1879, and more were on the hills than in the valleys. There was one case near the river, one near a marshy swamp, and several on high and dry land away from all such conditions and surroundings. To my mind, malarial cases are due to the effect of some general cause, some peculiar poison spreading over the country, for although the very first case was in a valley, there were cases on the high hills afterwards, that as certainly originated there as the cases in valley did upon low ground, and there have been no changes in the topography of the county for twenty years or more, nor any local changes that I can appreciate. Besides tertian ague and bilious remittent fever there have also been case of quotidian ague, typho-malarial fever and enlarged spleens, no congestive chills nor deaths as yet. The cases are scattered and affect all ages alike. The prevalence is about the same as during last year, but the cases of pure typhoid have been steadily decreasing during the last three years, and during the same period I have had two fatal cases of consumption, a percentage of one in twelve. There is one dam on the Housatonic within the limits of this town, and several of the smaller streams are dammed. None of the ponds are over ten feet deep. The beds of some of the smaller ponds are sometimes exposed part of the day, but they are never offensive and there has never been any malaria in their immediate vicinity. The dams were all constructed long years ago and none of them have been raised recently.

Sharon, *Dr. Knight.* It is somewhat difficult to determine the exact date when intermittent fever first was indigenous here. I have known of occasional cases for twenty-five years. The type was regular ague, and the cases were nearly all upon low ground and usually near Mudge pond and its outlet, and the worst cases have been near the marshy borders of this pond. There have also been some cases in the higher portions of the town, but the most of these near a swamp through which runs a sluggish stream. Malarial diseases have not prevailed very extensively in this town; all ages, unless it be the very aged, have been attacked. During the period that malaria has been indigeuous, it is true that we have not had much typhoid fever, but whether there has been any relation of cause and effect between the two I do not know. I have no theory counter to the old marsh miasm theory everything here in the manifestations of malarial diseases tends to sustain that theory. Mudge pond, before mentioned, is a deep pond; the dam was raised about a hundred years ago. The regular tertian ague has been the controlling type; malarial neuralgias have been common; there have been some cases of typho-malarial fever; none fatal, no congestive chills, nor malarial cachexia, Of late malarial diseases have been increasing in prevalence and severity.

Thomaston, *Dr. Goodwin.* There were a few cases of typho-malarial fever here near the Naugatuck river, on low ground, of course, in the valley of the river, in 1875, but there were no cases of regular inter-

mittent until 1881, although there were occasional cases of typho-malarial fever in the valley of the Naugatuck ever since 1875. This town has recently introduced water from a reservoir on a neighboring hill; the streets have all been dug up to lay the pipes; this was done in the fall of 1880. I cannot learn that this has made the slightest difference in the prevalence of malarial diseases. There has been a steady and general increase in their frequency in six years. The most marked cases of congestive chills and tertian ague occurred in the lower part of the town on the river flats, at a distance of three miles from the village proper, where the disturbance of the ground took place. There have been no ponds formed nor streams obstructed here for many years, and no other local causes to induce malaria, yet it is slowly advancing up the valley from the south. I have seen this year four typical intermittents that clearly originated here. There have been many vague cases called malarial, many no doubt properly so-called. We hardly ever see a case of pure typhoid fever, when formerly we would have at least half a dozen severe cases and three times as many slight ones. Malarial diseases are steadily increasing and advancing north and east; all ages are attacked I think the feeble and debilitated are most subject. We have had no fatal cases as yet. Until 1881 typho-malarial fever was the prevalent, and indeed only type; since then regular intermittents have been most common. I have been unable to learn of any ague here in the early settlement of this town, nor in the years succeeding.

Salisbury, Dr. Thompson.—The first indigenous case occurred in 1877. A male of thirty-five years, a broken down subject, residing near the Housatonic river. It was very prevalent in 1811,on the line of the Housatonic river for seven or eight years, reappeared in 1832, continuing until 1835, then ceased. I think that many coves along the river were covered in continued dry seasons, with a thick green scum. From '76–80 the summers were dry and the coves dry. Malarial fevers are now decreasing. From September, 1877, until the present time, not a house from Ashley Falls, Mass., eight miles north of us, along the Housatonic river to the Sound, has escaped. Have had four cases of congestive chills, one fatal, with excessively large spleen also. There are but two or three dams on the river. In my experience, dams prevent malaria. At the north part of the town, where we have a great prevalence, the scythe works have been abandoned and the dams suffered to decay, many cases resulted. Formerly two to six acres were flooded, now uncovered. An exceedingly small brook of very pure water, flows through the hamlet. It is 800 to 900 feet above sea level. Mt. Everett, 2,670 feet, overlooks it. Excavation for a blast furnace and many cellars for new houses and barns may be contributing causes.

Canaan.—Malarial fevers appeared here first in the summer and autumn of 1878, regular tertian intermittent, occurring in those near the alluvial meadows that border the Housatonic river. They have increased

in frequency in the Housatonic valley ever since, and have been confined almost entirely to that region, but there have been a few cases on the high hills. There were rather a less number of cases in the last season than during the preceding year. There has been but little mortality from this cause indeed, while perhaps increasing the sickness rate, the death rate has if anything been decreased.

North Canaan.—Intermittent fever appeared here in the summer of 1878 and has prevailed with increasing frequency until the middle of October, 1881, when the number of cases began to diminish. The most extensive and complete invasion has been through the Housatonic valley, especially the low alluvial lands near the river, but it has extended back to the hills to some extent. Tertian intermittent has been the more common type, but there have been a large number of the mixed and marked varieties, and a few cases of quotidian ague. There has been much less typhoid fever since the appearance of malaria. Malarial diseases have not reached the village yet, but their precursors are here. Last July there were 15 cases in the town, mostly tertian ague; one fatal case of congestive chill. The disease has advanced but nearly forsaken its older haunts.

Goshen.—The first cases here were regular tertian ague, occurring near the borders of Cornwall, in the autumn of 1880, and were confined entirely to the poor and destitute and those that exposed themselves unnecessarily at night. I have yet to learn of a case that originated in Goshen center, the principal part of the town. This village is on the highest ground in the state, this and Norfolk, the highest towns in the state. The winds blow fiercely in some seasons of the year and at all times there is almost constant motion of the air, conditions which in connection with the altitude are not considered favorable for the production or spreading of malaria.

Norfolk, Dr. Stevens.—I treated one case of intermittent fever in 1878 and know of none earlier than that. The next year I saw two cases. In 1880, I treated but one case, and this year four of intermittent fever. The first case was on high ground, both in relation to the surrounding territory and actually. The next two cases were a quarter of a mile from a stream, but it was a clear, rapid, running stream, nothing about its condition or surroundings to cause malaria. Indeed, I know of no cause to account for the outbreak of malaria in this mountain town. There has been no unusual disturbance of land nor any interference with natural drainage. Of the four cases this season, three were in one family. The ages attacked have been between ten and fifty-five. The frequency is increasing but not rapidly. There has been no other form than regular intermittent to my knowledge, except the modifying influence exerted upon other diseases generally. There have been no fatal cases. About seven years ago a reservoir was constructed, flowing a swamp of about 160 acres, which in summer and autumn is drawn down, making, one

would suppose, a very hot bed for malaria to breed and develop; but thus far there has not been a single case in the vicinity.

Dr. Welch, gives a similar account of the prevalence of malaria in Norfolk, having seen but very few cases and those all of the regular type of the chills and fever, well marked and alternating with regularity. The mongrel malarial fever so common where malarial diseases have long existed and the tendency is towards a recurrence to the continued type, is unknown in this region. There have been no cases in the village.

UPPER AND MIDDLE VALLEY OF THE NAUGATUCK.

The general characteristics of this valley are the same as before given in the summary of the physical features. The county abounds in high hills and deep valleys through which flow rapid streams, swollen to torrents in spring and summer and after heavy rains. The villages lie in the valleys mainly, although sometimes upon hillsides or elevated plateaus. The summits of the hills offer wide and extensive prospects and there are often quite large lakes in the elevated plateaus; artificial reservoirs are frequent, for manufacturing purposes as they give a considerable fall.

Winchester, Dr. Welch.—Intermittent fever first originated here in 1880 in people living upon low ground. Since then there have been a few cases each year. There is no evidence of the increase of malarial diseases lately. The borough is mostly in the valley extending to the hill-sides and some dwellings upon the summits of the highest hills. The hills here are very high and some very steep. There are two principal streams flowing through the town, one very rapid, the other slow, and a large lake or pond. The manufacturing interests are extensive and the population at Winsted quite concentrated. The other portions of the town are occupied mostly by an agricultural population. From the mountainous character of this region, one would not expect to find malaria here, nor has there been very much in this town, neither is it increasing as I can see.

Dr. Steele.—The first cases that originated in this town were in August, 1880, the type, ague with a chill every other day. There was little doubt as to its being an indigenous case, as the patient had not been outside the town limits for a year or more. He lived upon a hill-side, the ground apparently well drained. While there have been but few decided cases it is evidently approaching us. Such cases as have occurred since the one mentioned, have been on low grounds, but they have been but few.

Harwinton, Wolcott, Middlebury, claim to be free from intermittent fever. There have been cases there that originated elsewhere, but with possibly a case or two there has been no malaria in these towns.

Indeed with regard to this they claim that the high, hilly regions they afford are a resort of people from other towns that are troubled with malaria and are seeking relief. In Wolcott two slight cases are mentioned in persons living near the ponds. Besides a small pond, which has been maintained by a dam at the same height as it is now for seventy-five years, there are four large reservoirs kept for manufacturing purposes by the Waterbury Brass Co., who draw down the water every year, but the people living near these ponds are not affected with malaria. In Harwinton there are several small ponds which are usually low in summer, but there has been no malaria developed near them. The brooks are generally very rapid. This whole region is sparsely settled and very mountainous.

Plymouth, Dr. Heath.—The first cases of intermittent fever here were in August, 1862, among people living on low grounds and near a pond. All ages have been attacked, and with varying frequency the disease has prevailed ever since. I think malarial diseases are now increasing; there have been a few fatal cases of congestive chills.

Watertown, Dr. Munger.–In the autumn of 1874 I noticed that our cases of typhoid fever seemed to be of a mixed type; the bilious complications were more marked, and the greater number of cases were near a stream that was unusually low. Since that time the malarial type has been constantly increasing, until clearly marked cases of typho-malarial were developed. Eight or ten years ago there were several clearly marked cases of tertian ague, but they were all in persons that had lately returned from regions where malarial fever had been very prevalent. In 1879 I had two cases that undeniably originated here; since then there have been quite a number of cases of whose genuineness there can be no doubt, and many that have more or less of the characteristic symptoms, but without regular chills. I find it customary among the people when not feeling well and cannot name any specific disease to say they have malaria. I cannot learn that there was any ague in the early settlement of this town, but some thirty years ago or more there were two cases near a small mill pond that was drawn off and left. Typhoid fever has become very rare; before malaria was prevalent it was very frequent. I cannot find any cause that would induce malaria to develope here or remain in any special locality, indeed all the inhabitants live within a few rods of either a pond, stream, or river. There has been very little fatality; we have had no congestive chills nor chronic malarial cachecia. Of late, malarial diseases have been increasing slowly in frequency and somewhat in severity.

VALLEY OF THE CONNECTICUT.

Enfield, Dr. R. L. Strickland states that he had one indigenous case in 1856, and saw no other until ten years after. Dr. Parsons states that the first cases were previous to 1870; this would make it earlier than in

Hartford and other southerly towns. The first two cases were near the river but on high dry ground; they were intermittent of regular tertian type. The cases increased quite rapidly, and until the present year have been mostly regular intermittent fever, with only a very few cases of congestive chills. We have very little typhoid fever now, which ten years ago was very prevalent; all ages are affected except extreme age and infants. Since 1866 intermittent fever has been endemic.

Thompsonville, Dr. Parsons.—The first cases were intermittent; of late the majority of the cases have been located near streams or on marshes. Debility from any cause constitutes a predisposing cause; no congestive chills nor cases of very much enlarged spleen. Dumb ague and other irregular forms are prevalent; malarial diseases have been very rapidly increasing in frequency for the last twelve months. They seem to be easily controlled by quinine or cinchonida in full doses; all ages are affected. There are no new agencies at work. The stream which enters the Connecticut here past a series of dams has as well as that river been very low this year; and as it receives a large amount of filth the stream has been quite offensive at times. There are no more cases, however, along its banks than elsewhere. It is ponded just above the village and is a very sluggish stream.

(The pond alluded to by Dr. Parsons is surrounded by marshy land on three sides; the water is often low and the bottom covered with a rank vegetation. The inlet to the pond is through marshy ground and the stream is contaminated from the pond until it reaches the river. Measures, however, have been devised to prevent the pollution of the stream to a great extent and the result will be reported later. During the present fall there has been an epidemic of malarial and typho-malarial fevers with quite a large mortality. Drs. Parsons and Fitch both report typhoid fever, much less prevalent consumption uninfluenced. No changes in land or water. Dr. Parsons writes, I have been informed that the disease prevailed here one hundred years ago in a swampy portion of the town. (Cerebro-spinal meningitis is endemic.) Mortality from malarial fevers for the last three years ending with 1880, six; meningitis three.)

Warehouse Point, Dr. Fisk.—The first cases of intermittent that originated here occurred here in 1873, on rather low ground but dry and sandy; the tertian form has been most prevalent. There have been no changes to produce it or invite its stay. It is now diffused over the whole town, attacking all indiscriminately. There has been much less typhoid fever. An Italian physician states that after the railroad was built from Turin to Genoa intermittent fever began to prevail along its course where before it had been unknown. He attributed this to the interference to natural drainage by the gradings for the road. I think the traffic rather than the construction of such roads introduces malaria; the materials for clothing, fuel, and other necessities coming largely from malarial countries; this may be a contributing cause.

Broad Brook, Dr. Allen.—Cannot give the exact date—earlier cases were of the remittent type. From what I can learn there were cases as far back as 1850, and few in number. Malarial diseases began to prevail in 1875, the date of the completion of the Connecticut Central railroad. There have been no other changes nor any local conditions that cause more in one locality than in another. The cases are scattered over all parts of the town. There are four mill ponds, all rather shallow, situated in this part of the town, but no new dams have been constructed lately nor old ones raised. There has not been a case of typhoid for the last three years; consumption is uninfluenced; malarial diseases are still spreading.

South Windsor, Dr. Wood.—The first cases of intermittent fever occurred here in 1875. Our main street is 30 to 60 feet above the Connecticut river. We have no marshes within the limits of this town. There are seven small ponds covering 3 to 10 acres each; five of them have been from 30 to 100 or more years; the other two about 15 years. In 1856 there was one indigenous case who had not been 20 miles from here in 30 years; this was in Windsor. Malarial diseases have prevailed quite extensively, attacking all ages. Typhoid fever is much less frequent. There has been no cause for the production of malaria in this town. Malaria first appeared in East Hartford near the place where large loads of manure from New York were unloaded in the fall and remained until spring before being removed. Malaria followed its track directly and did not extend beyond it until carried to the other towns by persons afflicted with it. The first cases in the mountain towns east of us were carried there by young men who came there to work in tobacco. I do not say that this manure was the cause of the malaria, but it is a singular circumstance that it followed in its track so closely. In general it is more severe, recurs more frequently, and the cases are more obstinate and persistent in low places and near swamps, ponds, and streams. Commencing in such localities it has, however, extended throughout the town; but the greater number of cases, and the persistently recurring cases are upon the low grounds.

East Hartford.—There were sporadic cases from 1872 to 1875 in various parts of the town. In the summer of 1876, remarkable for intense heat and dryness, the thermometer rising to 100° in four days, and to 90° or above for thirty successive days, the disease became epidemic above and below the causeway. Near the river for half a mile north of the causeway across the meadows there are 174 inhabitants; 145 of these had ague. South of the causeway to the Hockanum river there were 194, and of these 116 contracted the disease; 72 per cent. of the total population. There is a sand bank containing 20 acres or more, bare at low water and covered by such vegetable matters as it has caught from the river; this summer it was mostly bare and offensive. Since 1876 it has been prevalent more or less every year. Typho-malarial fevers and the

irregular forms, especially dumb ague, have been increasing, and as elsewhere other types of disease are modified. Typhoid fever has decreased but not disappeared; the same is true of adjacent towns. All ages are attacked and whole families prostrated. It does not come so much to the notice of physicians as the people have become learned in its treatment. The low, flat bottom lands near the river which are overflowed spring and fall are the site of its greatest prevalency, obstinaucy, and most frequent recurrence. In driving down from the causeway a chill strikes one even on a warm day. The prevalence of malaria in this town and many others along the river has been attributed to the manure brought from New York and stacked in large heaps as it is unloaded from the scows. As this is brought from a malarial region where intermittents are indigenous, it is claimed that the germs of the disease are thus spread and introduced again and again. There may be some truth in the theory that malarial germs are thus introduced into this region; but if it be granted it is only an accessory cause and not broad enough to cover any but a very limited range. There are doubtless many contributory causes, but this does not appear to be of much importance. The cessation of the use of the manure would exert but a trifling effect upon the prevalence of malaria, in all probability, even where it is now most extensively used. Malarial diseases have prevailed extensively upon the meadows, and have been the principal diseases. Typho-malarial fever, dumb ague, and especially the mongrel malarial fever, have been very common; chronic malarial poisoning is not uncommon this fall. Typhoid fever has reappeared, having been almost unknown since the malarial type of disease has been the controlling one. The cases of malarial fevers are more severe and malignant, oftener fatal.

Ellington.—Intermittent fever first appeared here in 1877; there were a few cases in the valleys. The next year there were more and it has been gradually extending up the hills and to the eastward. The cases have been mostly regular intermittent; a few of typho-malarial. Although there have been cases on the hills, the majority of those affected have been those living upon low ground, near marshy meadow land or near ponds and streams. The first cases were in the western part of the town, and the spread has been steadily east and north. They are increasing in frequency and severity but the type not as distinct.

Somers.—As nearly as I can learn, the intermittent fever first originated here in 1878 with perhaps a few sporadic cases previously. There has never been any universal or general prevalence, but a few more cases each year. Including typho-malarial fever, there have not been much over a hundred cases in all, if as many. Malaria reached us from the west, and since its first appearance here has gradually extended towards the east, having reached Stafford Springs as the limit. As a rule, the valleys and plains are more liable to invasion than the hills, although these have not entirely escaped. There has not been any marked increase lately.

Suffield, Dr. Mason.—Intermittent fever first appeared here in 1877, that is the first indigenous case. The person attacked lived near a small meadow of perhaps five acres or more, near to a small stream; upon one side was a rapid brook, and the other a sluggish canal, not far distant was an old mill pond, the dam removed some years before; but the succeeding case was upon the very summit of a high hill, where one would infer that there could be no trouble with the natural drainage. I know of no causes to induce malaria here; the town occupies high ground and is hilly to mountainous, and the soil in the more thickly settled portions dry and sandy, thoroughly well drained. There is but little stagnant water within the town limits. There are two mill ponds whose average depth is about ten feet, and the bed of the pond is never exposed to the sun. The dams were constructed seventy-five years before malaria appeared and have not been raised lately. There have been no changes whatever to produce intermittent, either generally or locally. If one were to select the most unfavorable conditions for the development of malaria, Suffield would lay just claim to the front rank. There is but little low meadow land and the streams are rapid, and clear and pure. Since 1877, diseases of an intermittent type have steadily increased; tertian ague and quotidian are most common, typho-malarial fever very rare and not well marked, some cases of congestive chills, but none fatal, nor have there been any deaths from malaria. Hemicrania, and other neuralgic forms are of frequent occurrence. Indeed there are, one might say, as many variations as there are individual cases, for the disease adapts itself to every idiosyncrasy. Nearly half the houses in the range of my practice have been invaded from infancy to old age, children and adults alike are attacked; there are but few cases in those beyond middle life. Malaria has dispersed typhoid fever completely. This has been formerly a stronghold for typhoid fever, previous to 1877. There has as yet been no appreciable change in the type of malarial diseases.

Dr. Mather.—Gives essentially the same account, and explains the spread of malarial diseases by the agency of the atmosphere, which brings the malarial poison from the infected regions, south and west. There have been no local causes that have not always existed. During the past autumn there was a marked increase in the frequency of malarial diseases and in their severity, and the typho-malarial variety, which before had been not well marked, was more frequent and more clearly defined. There has been as yet little or none of what is termed chronic malaria or malarial poisoning; that type is developed when these diseases have prevailed longer.

Windsor Locks, Dr. Burnap.—The first cases were in the fall of 1878, regular intermittent, and upon low ground near Windsor Locks canal. The disease has been more frequent in the valleys of the Connecticut and Farmington than elsewhere, although by no means confined to these localities. They are increasing in frequency. It seems to have displaced

typhoid completely, but not influenced consumption unless to increase it. Water has been drawn off from the canal almost every Sabbath during the summer for many years. There have been no new causes or changes to induce malaria. Nearly all ages are affected.

East Granby.—Intermittent fevers appeared here in the fall of 1876 in the valleys near a low extensive meadow. The most prevalent varieties are bilious remittent and typho-malarial fever, but few of regular ague, more during the past year. Since their first appearance, they have steadily increased in frequency and become more marked in character. They apparently reached us from the river as they gradually left the immediate vicinity of the banks of the Connecticut, but would have reached us as soon from the south. This town is hilly, and settled by an agricultural population. The Farmington river flows through its southern portion, and the town belongs in part to both valleys.

Bloomfield, Dr. Gray.—Intermittent fever originated here about three years after it commenced in Hartford, which would make it 1875. I cannot fix the exact date of the first case; it was however regular intermittent as were the early cases generally. The town occupies a level, rather sandy plain for the most part, with but few hills and but little low meadow or swampy ground. The locality had no influence in including its appearance, which might as well been in one place as another, as there have been no changes favorable to its production during the thirty years which I have practiced here. Whatever may be the theories in regard to marsh miasm and other recognized causes, we must admit that here it travels very independently and with very great disrespect for the rules which have been laid down for it. Malarial diseases have increased in frequency this summer, having been stationary for awhile. There have been ten or twelve cases a month this past summer affecting all ages alike; even children a few months old have been attacked. Tertian ague has been the prevalent type; there have been a few cases of typho-malarial fever, but none fatal. There has hardly been a case of typhoid fever for the past two years, and since malaria appeared, the decrease was regular and rapid.

Hartford.—Intermittent fever appeared here in 1871, a case or two, and extensively in 1872. A sporadic case was reported several years before, about 1862, but none followed it. The first cases were frank intermittent upon low ground near the dike constructed for the Valley railroad. This runs north and south, although not in a direct line, and interferes decidedly with the natural drainage of the extensive low meadows which it crosses. If extensive upheaval of land is a cause of malarial fever it should exist in Hartford to a very great extent. The Valley railroad has been mentioned, the Connecticut Western, the Connecticut Central, and double tracking the New York and New England, the construction of the large trunk sewer on Franklin avenue, and similar operations extensively carried on in different parts of the city, especially the

deep excavations for the sewer on High street; the numerous building operations; new streets laid out and graded, and the large tract of land graded towards West Hartford might be mentioned, also the removal of the old water mains and relaying a double system in many places, and the pipes for steam-heating; but most of all was a custom now generally abandoned, of using the filth scraped from the streets as top dressing for repairing the macadamized pavement; the whole width of the street for long distances would be thus polluted. The researches of Dr. Sternberg have proved conclusively that gutter mud is rich in the germs of disease; as this mud dries up these germs find their way through the atmosphere, into which they are swept by the winds into the lungs and throats of the people, and an appropriate field for development is seldom lacking among a crowd. The unusually low condition of the Connecticut river for several years past is probably a factor influencing the frequency of malarial fevers, if it does not induce them to continue persistently and increase their severity. Be this as it may, malarial diseases have prevailed with increasing frequency ever since 1872 until the present time, when there appears to be a perceptible decrease. With this comes an increase in the frequency of typhoid fever, a fact which has been noticed repeatedly this year in different parts of the state. During the last eight or nine years malarial diseases have been the prevailing type, modifying all others and exhibiting themselves in a multitude of forms, intermittent, bilious, remittent, dumb ague, typho-malarial fever, hemierania and other neuralgias, malarial diarrheas and dysenteries, broncho-pneumonias, etc.; the puerperal state has especially been unfavorably affected, and malarial congestions and hemorrhages not infrequent. Infants and the aged have alike succumbed. Congestive chills and enlarged spleens have not been unknown, the latter so large as to cause death. As has been seen, it existed in the valley above and below us before it was known here, but it in all probability extended from Wethersfield, as it was quite prevalent there several years before it made its appearance here, and that was on its line of march. The mortality from malarial fevers here has steadily increased even for this year, but it must be remembered, as before stated, that here as in parts of the New Haven region, while the frequency is decreasing the severity of the cases and the mortality is increasing. Malarial diseases as a rule prevail a long time before they appear to any extent upon mortality lists. There have been more cases of typho-malarial fever, many severe and fatal. The comparative mortality between typhoid fever and malarial diseases is not given for Hartford, because there are quite a large proportion of the deaths from typhoid fever at the hospital in patients that have contracted the disease outside this town, hence the comparison would be unreliable.

West Hartford.—Intermittent fever appeared here about 1873, two years after it reached Hartford, apparently extending mainly from the

south, as the earliest cases were near Wethersfield upon low ground in a valley. The houses are generally upon high ground, and the population principally agricultural; there is not much low, marshy land in the boundaries of this town. What prevalence there has been has seemed to depend more upon some general influence, reaching here in time, than as the resultant of any local causes. The reservoirs for the water supply of Hartford are mostly within this town and adjacent to it. Malarial diseases had already appeared before the construction of the large reservoir, flowing several hundred acres, recently finished. Except the workmen engaged in building the dam and at work upon the grading and the like, many of whom had severe attacks of ague, I cannot learn that it has caused any marked increase of malarial diseases in the vicinity. Most of the cases are in the valleys and near ponds and streams. They are not, however, confined to such localities, as many cases exist as well upon the hills. Tertian and quotidian ague and typho-malarial fever have been the prevalent types, the latter, with the exception of a case or two of congestive chills, the only fatal form. Dumb ague and malarial fever have been frequent, as well as the neuralgias and other mixed cases. During the past year malarial diseases have rather increased in frequency, and there has been a recurrence of typhoid fever which has been almost unknown since the prevalence of malaria, as in places where malarial disease have long been indigenous. Cerebro-spinal meningitis has also become so, although not very frequent nor malignant.

South Manchester, *Dr. Parker*.—Intermittent fever first appeared here in the fall of 1874; the village generally occupies low ground, so that all the cases have been upon such, and as ponds and streams are so frequent the distance from one or the other could not be very great. There is a small stream flowing through the place, which has two dams upon it, and its waters are considerably polluted. South Manchester is, comparatively speaking, new; that is, it has increased 90 per cent. within the last ten years. Whether the extensive upheaval of soil in building operations has had any causative relation to malaria is an interesting question. The sewers empty in the western part of the village and there are more cases, perhaps, originating in that region. The ponds are but a few feet deep and if dry in summer are very offensive. All ages, from the nursing child up, are affected. Tertian ague is the most prevalent type, the only fatal varieties, typho-malarial fever and congestive chills.

North Manchester, *Dr. Griswold*.—Intermittent fever appeared here in 1878; the first cases were on high ground a half mile from any pond or meadow. There have been no changes, whatever, to induce malaria, no telluric changes nor obstruction to water courses that have not existed for years. The greater number of cases appeared near a low, swampy tract, but this has existed in its present condition for a great many years. There have been no new lands flowed within the last eight or ten years; the ponds average five feet in depth, and only rarely, in very dry sea-

sons, are their beds ever exposed to the sun. About 70 per cent. of all the cases I see appear to be of malarial origin; all ages are affected, the middle-aged especially. Regular intermittent is the most prevalent type, typho-malarial the only fatal form. I can find no record or history of the existence of malaria in the early settlement of the town. After investigating and watching its features closely I conclude that vegetable decomposition alone is not sufficient to produce it, nor does elevation of the land nor the best sanitary surroundings protect. Telluric changes have little influence upon its production.

Dr. Whiton.—The first cases of intermittent fever which I met in this town, and indigenous, were in 1876, and not connected with any of the influences usually supposed favorable to the development of malaria. A majority of the people have been affected; in many instances whole families of from four to eight persons are attacked; quite old people are not as susceptible. Tertian and quotidian ague are the prevalent types. There have been two or three cases of congestive chills, and a few of typho-malarial fever, but I have seen no fatal cases of any variety. Malarial diseases are certainly not increasing, and I think decreasing in frequency. I know of no local causes nor changes that could exert any influence upon their causation.

Hebron, Dr. Pendleton.—The first case that I was unable to trace to any other source, occurred in August, 1870, upon moderately high land; there was a pond half a mile distant; no marsh or swamp in the vicinity. There was a railroad built through the southern part of the town eight or ten years ago; built through a swamp part of the way; no natural drainage, however, has been obstructed by it. There has been more ague in this vicinity. There are no other favoring local conditions, actual or possible, except such as have always existed. I have been informed lately by an old man of eighty-one, that his father used to tell him that people living in the vicinity of a tract of flooded land were affected with fever and ague. I should infer from his description that this was from eighty to one hundred years ago. I should judge that malarial diseases were increasing here in frequency; tertian ague has been thus far the most common type; chronic malarial poisoning, giving rise to various indefinite symptoms and forms, is more frequent; also dumb ague. I have seen no fatal cases that originated here. There have been some cases of congestive chills, but in persons that contracted the disease elsewhere. There have been no cases of typho-malarial fever, and I have seen no enlarged spleens developed here. I should infer that there had been less typhoid fever since the appearance of malaria. The reason for the present spread of malaria is not to be found in local conditions, but the producing cause or source has been introduced by some general agency, and has found, so to speak, a soil fitted to reproduce it where formerly it did not exist.

Glastonbury, *Dr. Bunce.*—There was one sporadic case that originated here in 1861, regular intermittent, the chill every other day. The house was under the brow of a hill with a swamp east and south; there was a mill-pond about fifty rods east and a little north, and the swamp to the south had a shallow, muddy pond. There were no other cases until 1877, and from that time they increased steadily until they were generally prevalent. The first cases were near the river, but it has not been confined to the low lands, but became quite as common in the eastern, hilly regions of the town. The tertian has been the most prevalent type; there have been many cases of quotidian and a low type of typho-malarial fever quite severe but none fatal. Malarial diseases have prevailed quite extensively, affecting all ages. I should judge that there was no increase of late in frequency. I have seen no cases of typhoid fever since malaria prevailed, until the present season, and very little consumption. There have been no local changes to account for the spread or introduction of ague. There are many ponds, the average depth from two to three feet, and in dry summers the beds are exposed to the sun. There are extensive meadows and considerable low bottom land flowed in spring and autumn.

South Glastonbury, *Dr. Rising.*—In the summer of 1871 there were two cases that were caused by remaining all night in a malarial district, and two that originated here; they were of the quotidian and tertian types. Since that time the frequency increased rapidly, sparing neither age nor sex, attacking the infant of six months and the old man of seventy, but the greater number of cases were between the ages of fourteen and thirty-five. There were no local causes except the unusually low state of the river be considered such. I think the germs of malaria reach Connecticut from the flats of New Jersey, and passing along the coast, as they meet the streams follow along their course. Tertian ague has been most prevalent; there have been two cases of congestive chills, one fatal, a few cases of typho-malarial fever, one fatal. The cases of clearly marked intermittent are not increasing, but the mixed cases generally termed malarial are very numerous. This used to be a hot bed for typhoid fever, but for the past ten years there have been but few cases. Consumption is if anything more prevalent than formerly.

Wethersfield, *Dr. Warner.*—The first cases originating in this town were of the tertian variety, with one case of double tertian. There was no rule in regard to location, the cases were sporadic, for several years one or two near the cove, others on the hills. The sporadic case on the north meadows in Hartford in 1861-62 is interesting in this connection. There was no general prevalence until about 1870, but an increasing frequency; since then there have been epidemic years and those when there was no large increase in frequency; there has been less this year than for three years previous. I should judge that at least half of the population, perhaps more, had during this period been affected, including all ages

from six to ninety. There has at times appeared to be more cases near the cove, but not universally so. (This cove is shown in the drainage map connected directly with the Connecticut river.) A large proportion of the cases have been regular intermittent, the tertian type predominating and a few have been fatal; I recall but one fatal case of congestive chills in Newington which was rapidly fatal. There have been occasional cases of typho-malarial fever but not frequent. Since the prevalence of malaria, typhoid fever has been rare and consumption far less frequent. I know of no local causes to produce malaria; there have been no changes for years. that is with the exception of the construction of the Valley railroad, but malaria was already here, and there has apparently been no greater prevalence near the railroad than elsewhere. There is a good deal of low land and level meadows, wide tracts are over-flowed by the river, but that is common to this whole region; the low bottom lands are over-flowed spring and fall.

Newington.—This was formerly a part of the town of Wethersfield, and in general the same conditions are prevalent here. As it is back from the river, there are no lands to be over-flowed except on a smaller scale by the streams which are swollen considerably by heavy rains. The hills are more abundant here, and there are fewer level plains. Malarial diseases became more or less prevalent in 1871 with perhaps a few sporadic cases before that date. The dwellers upon the hills have been affected as well as those on the low lands, but not as severely, nor have the cases been as persistent. There have been a few cases of congestive chills and more of typho-malarial fever; there have been fewer cases the past year; malarial fever and mixed cases are more frequent.

New Britain, *Dr. Swasey.*—Intermittent fever, principally of the tertian variety, became prevalent here in 1872; during the preceding year there were one or two cases reported. I do not think that the locality had any influence, as the region where the first cases occurred has been quite free since. They soon became quite general and have prevailed with varying intensity ever since. Previous to its appearance I know of no local causes that might have induced its malaria, but previous to the outbreak of the epidemic of three years ago, large trunk sewers had been built; these were the means of draining lands formerly flooded with water, and it was near these that the epidemic commenced and prevailed most extensively, but by no means confined to these localities; other portions not at all affected by the sewers have been invaded. The marshes referred to were large, low plains with rank vegetation upon which water stood, having no outlet for drainage until the construction of the sewers. Intermittent fevers have prevailed throughout the town more frequently upon the outlying streets, attacking all ages, but chiefly the middle-aged. The increase for three years was marked up to a year ago, since which time I should say they have become stationary; I can recall but one case of typhoid fever for several years and

that very recently. I think there has been a decided increase in consumption; tertian ague has been the prevalent type; we have also had quotidian and quartan, also typho-malarial and congestive chills; cases of the last two fatal; some enlarged spleens and chronic malaria have been seen.

Rocky Hill, Dr. Griswold.—There was one indigenous case in 1857; the next cases were in the summer and early autumn of 1872, of typical intermittent occurring on high ground. The first case in 1872 was entirely away from the vicinity of marshes, ponds, or streams; during the summer, there were four near a mill pond which was in the same condition it had been for seventy-five years. I do not know of any probable local cause for any of our cases, nor believe that local surroundings have had anything what ever to do with malarial diseases in this town. I do not know of any disturbances or conditions out of which malaria could be evolved. We have no possible causes capable of generating that hypothetical factor, denominated marsh miasm that have not been present with us for the past hundred years. The Valley railroad was built along the river in 1870-71, but malaria did not appear until 1872. We have two mill ponds in the lower part of the town on the same stream; they have been in the same condition as at present over a hundred years; there was a third between the other two, built twenty-five years ago. The present summer one of the old ponds has been emptied out for the season. There has been no more or less of malaria about these ponds than before their abandonment. In the summer of 1876 the three ponds, all within a distance of about a half mile, were drawn off and the vegetable decomposition collected in them left reeking in the sun in the condition supposed to favor the evolution of paludal poison, yet there were no cases of fever of any kind in the neighborhood, but there was intermittent in other parts of the town remote from them. In regard to the presence of ague, in the early settlement of the place, I learned that the Rev. Calvin Chapin, pastor of the Congregational church from 1792 to 1847, had fever and ague; during the professional life of Dr. Aaron Horsford, the grandfather of my informant. Dr. Horsford practiced here from 1774 to 1804, the time of the occurrence of the ague probably about 1800. Whether this was an indigenous case cannot be known, but I think it probably was. I can learn of no other cases until 1854 when I had myself three severe attacks of tertian intermittent, but I had the previous year been living where fever and ague prevailed; still there may be doubt whether the disease did not develop until a year after it was contracted. In 1859, a gentleman living in the south part of the town, who to my positive knowledge could not have contracted the disease elsewhere, had a pronounced tertian intermittent. There were four or five cases between this and 1872; but all had been where malarial diseases were prevalent. In the spring of 1872, we began to have malarial diseases as a settled matter; that season gave us per-

haps a dozen cases; from that time it has *prevailed*. There is no month in the year but that we have severe cases of it although there is less in midwinter. Whether the cases which first manifest themselves in the winter are generated then or are the results of infection in the warmer seasons preceding, has not been determined. A few days' residence has in some instances been sufficient to develop malaria, but how long in other cases the poison may remain inactive in the system cannot be told; my impression is, many months. Malarial diseases are impartially diffused over the whole township. In the beginning, regular intermittents were the prevalent type, now there are more bastard cases; dumb ague and the mongrel-malarial fever without a well developed cold stage have been common; during the present summer there has been more typho-malarial fever. I have seen two cases of enlarged spleen, and several of congestive chills, which has been the only fatal form, and that in two or three old people. The frequency increased for four or five years; the last three have been about the same in number, but the phenomena developed more varied and irregular. There have not been more than one-fourth the number of cases of consumption in the past ten years as in previous decades. Typhoid fever has been absent since malarial diseases came in, but whether the presence of malarial diseases has had any influence in diminishing typhoid and consumption, or whether the facts are simply coincident, are matters of doubt; my opinion would be that there is some unknown relationship between the income of intermittent and the outgo of typhoid, but not fortified by such evidence as to render it an established fact. I noted this fact in 1877, and suggested the question of relationship between the two types of fever and again the next year. The acceptance of the idea of the substitution of one form for the other, would militate against the doctrine of specific germs as the etiological factors for each special fever. The theory that there are living microscopic existences that get from the soil into the human system and produce there the phenomena of intermittent and the cognate diseases as developed by the Italian physician Crudelli, is plausible but it lacks confirmation. I have discussed the influence of local causes more fully elsewhere.*

Berlin, *Brandagee*.—The first cases occurred in 1867, but it did not become epidemic until 1871 or '2. They were upon low grounds on one of the branches of the Mattabeset; even to the beginning of these branches. The disease has become prevalent along the course of the river, avoiding the higher portions of the town. The main street of the town on the old Hartford turnpike has been entirely free. The tertian has been the commonest type; there has not been much change in frequency of late. They appear in spring as soon as the frost is out of the ground, along with pneumonia, and leave with the typhoids and he-

* Proceedings Connecticut State Medical Society, 1881, pp. 81 et seq., on the Etiology of Malaria.

patic derangements in autumn; the winter is nearly exempt. There have been a few cases of congestive chills that seemed like apoplexy and succumbed in the third chill. The greatest part of the population is near the ponds. Our winds are mostly southerly, and those living to the north of the ponds are most troubled. I have very young patients, two months or less, who commence with vomiting generally, and often with convulsions; at the same time I meet with old subjects, 80 or more. Cases very generally are cured, but when the causes are active recur in fourteen days, but may be staved off by medicine. In some localities agues pretty certainly appear two weeks after labor; we have, too, premature labors frequently produced by agues. It constitutes the prevailing diathesis and complicates all diseases, acute or chronic. The treatment of diseases must be different: quinine takes the place as an antipyretic in the place of our old antiphlogistics. Consumption ten years ago occasioned one-sixth of the deaths. For the last two years there have been no deaths among residents from that cause. Uncomplicated typhoid seems to have disappeared.

Dr. Mead.—Malarial diseases, which have been hitherto confined to the low grounds, seem to be invading the hills. Several years previous to the existence of malaria as an epidemic, five dams were constructed within this township, flooding a large area of swamp land; the beds of the ponds, peat, clay, and gravel, most prevalent in East Berlin and Kensington. The hills are mostly elevations of trap rock. There has been one death from congestive fever in the last three years; cerebro-spinal meningitis is indigenous. There has been an unusual prevalence of typho-malarial fever this fall—severe cases.

Cromwell, Dr. Conland.—The first cases that occurred here were in 1870, with perhaps one or two in 1869, on low ground near the river, and was at first confined to these, but not generally prevalent. The then resident physicians inform me that one or two cases occurred prior to the time ground was broken for the Valley R. R., but it did not become general until after the completion of that road. It has stamped out genuine typhoid but has not influenced consumption. The low lands bordering on the Connecticut river are overflowed during ordinary freshets in spring and fall but except a small strip of land, a short distance south of the dwellings; there is no stagnant water and the meadows are quite dry in summer. There were no other causes except the building of the railroad; this may have been accessory, but the disease was here before. I do not believe a family here has escaped its influence; all ages are attacked alike. If anything, the frequency is diminishing, but not markedly. Typho-malarial fever has been the most prevalent variety of late.

Portland, Dr. Ladd.—There were cases of intermittent fever in 1868 and '69, in Quarryville, near the river upon low ground, and in 1870 and '71 it became generally prevalent, and has continued with epidemic years, that is, years when more extensively prevalent than others, until

the present time. The building of the Air Line railroad has been assigned as a cause by some, but as there was the same progressive movement in this type of disease where there were no local causes as where such as have heretofore been considered as favorable exist, that it seems one must look for some other than local causes to explain its manifestations. The diseases of this type are pretty generally diffused over the whole town, both upon low land and upon the hills; the quarrymen appear to be the most affected. The youngest case I have seen was in an infant three weeks old; the mother had it at the same time; antiperiodic remedies were easily successful here. I should think nearly all the people had been influenced by some variety or other of malarial disease. The prevalence is about the same I learn as in former years; the most common forms now are the irregular types, mongrel malarial fever, dumb ague, and the like. Typho-malarial fever and congestive chills have occurred, and several cases of enlarged spleen.

Chatham, Dr. Worthington.—The first cases of intermittent fever that originated here were in August, 1875; they were on high ground with a meadow a half mile distant, which is flowed in winter for a reservoir. Malarial diseases have been slowly creeping this way from the vicinity of Middletown and Portland ferry. I do not think the railroad through the town had any connection with the causation of malaria, as it commenced in Portland while the railroad was under discussion, before its construction was commenced. Perhaps from one in six to one in ten have been affected; age does not make much difference. I have seen no cases among infants; it is diminishing in frequency and has been for several years; there has apparently been an increase in consumption. Location exerts little influence; there have been perhaps more cases along the course of a small stream that runs through a part of the town. No more cases near these ponds and on this stream than two or three miles away, and I do not see much relative difference in the number attacked nor the severity on low swampy ground and on high, dry ground. The streams are generally rapid, and with the exception of the meadow mentioned I do not know of any flooded ground. Intermittent of the tertian variety has been most common; there has been some typho-malarial fever, a few cases of congestive chills, and two or three of enlarged spleen. It has prevailed in the most hilly districts as much as in the lowest or flattest, and five or six miles from the railroad as much as in the immediate vicinity. The first case was near Portland, where it had prevailed some years, and from whence it apparently extended.

East Hampton, Dr. Field.—The first cases of indigenous intermittent that occurred in this town were in 1877, two years later than its appearance in the northern part of the town, as nearly as I can fix the date, and was on high ground, but there was a pond about a half-mile away with low water and a foul smell, especially at night. I have seen but one case of congestive chills; several of enlarged spleen; but little typho-

malarial fever. It affects the old and young, but more especially weak women. It seems to have pushed typhoid fever out completely. I have not seen a case in three years. So far as I have been able to judge, it has exerted a bad influence upon consumption. There are no causes that have not existed for the last eight years. We live in a clean, pleasant village. There are several dams on a clear-running stream of pure spring water, but none recently constructed.

Colchester, Dr. Swift.—The first case was a form of tertian fever of a mild character, and occurred in 1868 or '69. The ground was low. My first cases were of workmen on the Air Line railroad then under construction, and cases have occurred all along the line of the new road. Malarial fevers have been more frequent on low marshy ground. The long and severe droughts that have prevailed here the last two seasons have seemed to greatly increase their frequency. Owing to this dry weather ponds and reservoirs have been drawn down lower than ever before by means of ditches leading from them to the factories, thus uncovering large areas of mud and silt to the sun's rays. The cutting of wood from large tracts of forest land for railroad ties, timber, and for charcoal and firewood, must be a factor in the production of disease. This is being done throughout the state. The irregular fevers and dumb ague have been most common. The large ponds and lakes alluded to are located in adjoining towns, but all near the boundary line.

A prolific source of typho-malarial, in my judgment, in addition to the exposure of the beds of ponds and reservoirs, is defective drainage and shallow wells, the latter affording only surface water which, during a drought, must become loaded by impurities. Then large pools of stagnant water are left when the ponds are drawn down as far as possible. One dam has been raised within two years, and one was washed away some 6 or 8 years since; one reservoir constructed 25 years ago, the dam was recently raised; one reservoir near, in East Haddam, covers 25 or 30 acres, and much of the time its bed is uncovered and the dead trees and bogs exposed to the sun; one within the town limits floods a flat marsh of many acres. Since the foreign element was introduced, defective sewerage has been the rule, and consequently typhoids, dysentery, and diphtheria have prevailed. A large amount of drainage has been done with great improvement in the general health, but we need to be educated on the subject of proper sewerage and drainage as well as others. It is hard to convince otherwise intelligent persons why a well, taking pollution from barn, stye, privy, and sink should poison them any more than their healthy great-grandsires who built the house, dug the well, and drank from it for 70 years. (They do not consider that the subsoil has been gradually more and more contaminated until it extends to the area drained by the well.)

Colchester, Dr. Chase.—My first cases, about eight years ago, soon after the completion of the Air Line R. R., were markedly intermittent. I had

about twenty cases during the summer, half quotidian, the other half having chill every other day; none of these were on very low land. There have been no other changes except the building of the railroad to account for the appearance of malaria. In Exeter (Lebanon), near a pond which is drawn low every summer, nearly every one in a mile radius has had malaria. The Union pond lost its dam several years ago and has returned to its original state of a meadow; this covered about one hundred acres. Half a dozen families live very near it and in only one of them has there been a case developed, and that quite recently. Three families living half a mile from it, and on very high ground, have been very severely afflicted. Two years after the onset I saw many cases of remittent fever that ran about two weeks; have seen none the last few years. Irregular forms that can not be well classified are the most prevalent. I have seen one case that I called congestive; there was pretty free vomiting of blood and the urine was loaded with it as shown by a microscope. Malarial diseases are the most common, typhoid has entirely disappeared. I have seen an infant nine months old have a chill at a given hour every day, followed by fever, controlled by quinine and so on to the very aged. The frequency appears to remain about the same, slightly increasing if anything; hepatic derangements and jaundice are frequent complications.

Middletown, Dr. Edgerton.—There were a few cases of intermittent fever in 1870 and the two years following, but it did not become extensively prevalent until 1872. A sporadic case was mentioned in 1869. Probably one-half or even more of the population, have had within a few years, some form of malarial fever, mostly intermittent; many having had intermittent for two, three, or four seasons have ceased to have it during the later years; others who resisted previously have had it during these years. It is particularly noticeable that the *foreign-born* population are most susceptible, next to them those who have more recently come here to live, although American. In the older and more central part of the city, scarce a case has been developed outside of the servant class, who have probably in most instances acquired it elsewhere. This is probably due largely to the greater altitude of that region, besides it is inhabited by older residents.

Dr. Cleaveland.—The first cases of intermittent fever that I saw were upon low ground near a marshy tract, with a stream upon the other side. The second case that I know of was upon Fort Hill, an elevation south of the city, near the Hospital for the Insane, and about eighty feet above the level of the river. Ever since this place was settled, it has been exposed to all the elements one would suppose favorable to the production of malaria. Running the whole length of our territory is the Connecticut river, on the south and south-west are ponds and streams, and the same on the north and north-west; joining the two, is an extensive marsh and swamp, leaving only a space of high land perhaps fifty rods wide,

to connect us with the main-land of Connecticut, yet with all these surroundings and with only imperfect drainage, malaria was unknown, from the settlement of the place in 1635, until 1873. Since 1870, pure water in abundance has been introduced, and the city has been thoroughly sewered, yet malarial diseases are abundant. Intermittent fever of the tertian type have been most common, but are now diminishing in frequency. There have been, I learn, some fatal cases of congestive chills.

Dr. Osborne.—There are no causes for the prevalence of malarial fevers that have not generally existed; there are some obstructions to drainage, but none of late origin. The gradings for the railroads may have made some changes, but there has been no increased frequency near the cuts or embankments. The low flooded lands by the river are of a clay soil, mixed with sand, and an alluvial deposit above brought by the river; the beds of the ponds are exposed only in dry weather, but are then offensive. There is less typhoid fever, and I think more consumption, since the prevalence of malaria. The mixed or masked malarial cases are now the more prevalent type; these are increasing, while regular intermittents, before the most frequent, are decreasing. There have been fatal cases of typho-malarial fever and congestive chills.

Durham, Dr. Matthewson.—The first cases of intermittent occurred in 1874 upon high ground. There were no unusual causes to induce its appearance. There were a few cases every year; no rapid increase in frequency. There was a localized epidemic mostly of typho-malarial near Bailey's pond; about two years after the dam was constructed, there were about 100 cases within a mile of the swamp. This pond flooded a large swamp, a considerable portion of which was a low, bushy swamp, and the rest a boggy meadow; from six inches to five feet was the depth of the water, and the small stream that was its natural outlet was also that for the drainage of a large area back of the pond, so that the sub-soil water was largely retained. Since the pond was drawn off, and the dam taken down, malarial diseases have decreased in that region. I have seen but one case of congestive chills in the vicinity of Durham street. I should think one-quarter of the people have suffered from some form of malaria, mostly tertian, some quotidian; no cases east of the vicinity of Durham street. The aged and debilitated are the most subject; during the past summer, women especially have suffered from retching and vomiting. During the paroxysm, typhoid fever has disappeared and at present we have no consumption.

Middlefield.—In 1874, intermittent fever reached here, extending from the valley of the Quinnipiac, and has prevailed more or less ever since. As the population is mainly scattered, agricultural mostly, there have been no very extended epidemics. The cases have perhaps been as frequent upon the hills as in the valleys; indeed the town is quite hilly, almost mountainous, with comparatively little low land. The meadows towards Middletown are the most extensive. There are several quite

large ponds and from one or two there have been complaints of offensive smells, but there has been no unusual prevalence of malaria in their neighborhoods. Typho-malaria fever has been of late rather the more prevalent type, that and the mixed malarial cases. The mortality has been slight. There has been since then little or no typhoid fever, formerly a very prevalent disease.

Haddam, Dr. Haven.—The first cases occurred in 1872, on low ground near the ponds. It has manifested itself in localities especially favoring its development, particularly in the vicinity of stagnant ponds, in the vicinity of brooks and in marshy places *near the river.* The disease appeared soon after the construction of the Valley railroad, and was more common along its line than elsewhere. Malarial diseases have prevailed more extensively in the southern portions of the town, and especially in the vicinity of a pond which is surrounded by low, marshy ground, and from which offensive odors often proceed. An effort was made to fill up this pond and improve things about it; since then there has been much less malarial disease in that vicinity. But very few cases have been seen two or three miles back from the river. Probably no locality in this vicinity has suffered more than the southern part of this town, and Goodspeed's and East Haddam landings, which are in the vicinity of the stagnant, filthy pond before mentioned. At Goodspeed's there is a sluggish stream, much low, marshy land, and the drainage imperfect. In all this region, the disease has been very general in all its manifestations. Of late there have been cases back from the river, but it has not extended far. Malarial diseases are decreasing in frequency. There have been one or two fatal cases of typho-malarial fever, but of no other type.

East Haddam, Dr. Bell.—Intermittent fever first appeared here in 1873 or 1874. The first cases were at Goodspeed's Landing, on the banks of the Connecticut. There is a low meadow near, upon which there is stagnant water in summer unless there has been but little rain. Some years ago I had a case near here on the top of a high hill, but there was a swamp hole quite near. There has been no local cause, unless the unusually low state of the Connecticut river be so considered. There are several ponds in the village of Moodus on a rapid stream. A dam was built some five years ago for a reservoir back in the woods. This is drawn down in summer. This year the ponds were kept pretty full, yet there has been more intermittent fever and it has also extended further back upon the hills. There are but few houses that have escaped invasion since the commencement of the prevalence of malaria, and all ages have been attacked. Tertian ague has been most prevalent, and its frequency is increasing. There has been but one fatal case of congestive chill to my knowledge. Mixed cases are very common; also the mongrel malarial fever, with no very marked chill. There has been much less typhoid fever. I can see no difference in the frequency of consumption.

Chester, Dr. Turner.—The first cases of intermittent occurred here in 1875, mostly within a mile of the Connecticut river. Cases are found on the hills as well as in the valleys, without partiality, although, after all, more prevalent within a quarter of a mile of the river or of a cove that sets back nearly a mile from the main river. The regular intermittents are the most prevalent, but quotidian is very common. I think the frequency increased very much last summer, and at present there are many cases. There have been no new agencies at work to induce malaria. There are two principal streams; both empty into the cove. There are dams and factories extensively for two to three miles; the water is clear and pure; the streams rapid and but little marshy land. It has entirely taken the place of typhoid fever, and consumption is more rare. Should think more than half of the people were affected, from child of 2 weeks to old age.

Essex, Dr. Hubbard.—The first case was in 1861, intermittent fever of tertian form on low ground. There was but one case to my knowledge then and no others until ten years later. The disease seems to be diminishing in frequency of late; masked and irregular forms have been the most prevalent during the past year. Hepatic derangements have seemed a predisposing cause oftener than any other. No effect has been produced on the frequency of typhoid fever. At least 25 per cent. of the population are affected, of all ages. There have been no unusual causes nor any changes to account for the presence of the disease. Cerebro-spinal meningitis is indigenous. The only fatal cases have been of typho-malarial fever.

Lyme, Dr. Ely.—The first cases in this town were in 1876, of typho-malarial fever upon low ground, near a large pond, which had been brought very low by long-continued drought, leaving a large area of its bed exposed to the sun and extreme heat. After the malarial poison is once developed it then finds its way to places which would never have originated it. I should judge that about a third of the population had been affected. Typho-malarial fever has been the most prevalent the past summer, but all the common types have prevailed, and many mixed forms. Last autumn there was some malarial dysentery. All diseases are more or less modified. The frequency is diminishing.

Saybrook, Dr. Bidwell.—Intermittent originated here in 1876. There was no special locality influenced. There were but five or six cases the first year; the second year more, but it did not become generally prevalent until the third or fourth year after its appearance. Whenever a case occurred in any locality in the autumn there were sure to be many more cases in that locality the next year. It has been very general, attacking a majority of the population, and has superseded typhoid entirely. I have seen no influence upon consumption. Tertian ague has been most common, but there have been cases of quotidian; a few congestive chills; no typho-malarial fever; no fatal cases except among the aged.

Old Lyme, Dr. Griffin.—The first cases of intermittent originated in this place just after a severe rain-storm in August, 1877, on low ground surrounded by marshes. Regular intermittents are the most prevalent; some cases of typho-malarial have proved fatal. Malarial diseases are now diminishing. The malaria has attacked all classes, the rich and the poor, the clean and the unclean. The families who have paid particular attention to drainage and all sanitary measures are as violently attacked as those whose dwellings are surrounded by filth and swamps. Those who live on high hills with no swamps near are not exempt. It has attacked children of all ages largely, but the attendance at school has been but slightly interfered with. As near as I can ascertain, malaria existed to a very limited extent in the early settlement of the town. When the water in the ponds is low, the beds are exposed to the sun to a great extent and exceedingly offensive, and those living near suffer severely from malaria. Malarial diseases have prevailed the length and breadth of the town; but very few have escaped.

Westbrook.—Malarial diseases first appeared here in 1875, regular intermittent upon low ground. As in all the neighboring towns, there were cases in 1850, when the railroad was constructed, among those especially that worked upon the road, living generally upon low ground near their work. There were a few cases for some years after, when they entirely disappeared until 1875, when there were a few cases, and the frequency constantly increased until the past year, when they were about as frequent as the previous year. From a third to a half of the population, perhaps more, have been attacked, including all ages; more among the middle aged. Congestive chills and typho-malarial fever have been fatal.

Clinton and Killingworth.—The history of malarial diseases in these places is about the same as in the neighboring towns. In Clinton, intermittent fever, as in all the towns along the line as far as New London, was prevalent in 1850 and a few years after, but only sporadic cases occurred until 1876. In Killingworth, intermittent fever did not appear until 1878, with possibly a sporadic case or two before. Since then, malarial diseases have prevailed more or less, as much upon the hills as in the valleys and lowlands. Typho-malarial and the irregular forms have been more prevalent during the past year. There have been but few fatal cases. The frequency has not changed very much during the last two years.

Madison, Dr. Webb.—Since 1850 there were only a few cases until 1876, when intermittent fever became prevalent through all this region. Since then they have prevailed quite extensively, affecting all ages; the symptoms more marked in the young. There has been less typhoid fever and consumption since malarial diseases prevailed. The fatal forms have been typho-malarial fever and congestive chills.

Guilford, Dr. Griswold.—From 1852 to 1878 there were only isolated cases. In the fall of 1878 it began to increase in severity. The first cases developed near a pond surrounded by marshy flats and near the lake in North Guilford. The greatest prevalence in Old Guilford was in 1879–80, decreasing in 1881; while in North Guilford it reached its height in 1880–81. Dr. Talcott states that his experience has been to show him that it prevails on the west side of rivers. I have found it on the hills as well as upon low marshy land, and have noticed it to pass over untouched such ground to reach the hills. It has appeared in Falkner's Island, some five miles from the main land. The inhabitants are often in town in malarial regions for several days at a time. As only one member of the family has been affected, the disease might have been contracted here and carried in the system undeveloped for awhile. Intermittent and dumb ague have been most prevalent. There has been one fatal case of congestive chill.

THE VALLEY OF THE FARMINGTON.

This river is the principal tributary the Connecticut receives in this State; there are several smaller sub-divisions of the Connecticut river valley, as shown by the heavy black lines which show the dividing lines of the watersheds of the several smaller tributaries; that indicating the Farmington valley is, of course, very irregular, like its river. Towns that are partly in one, partly in another system, are either included in the one where their largest segments are, or else where the principal village lies. These towns are, of course, in both valleys, and one or two border on both rivers.

Windsor, Dr. Bell.—The first cases appeared in 1875, intermittent fever, and upon high, dry ground. There were no marshes near. They were about a half-mile from the Connecticut river, about a quarter of a mile from the Farmington. There have been no cases of congestive chills until the present fall, when there was one. All ages are affected, and all parts of the town. The most fatal form has been typho-malarial fever. Cerebro-spinal meningitis is indigenous; typhoid fever less frequent. It took three years to reach Windsor from Hartford.

Poquonnoc, Dr. Ensign.—First cases in 1876; two of intermittent on high ground. It was sixty rods from a dam on the Farmington, but this had been built forty years. The Farmington is a rapid stream, and the ponds are never dry, except in protracted drought. More than half the population have been affected, and all ages. There have been no recent changes to account for its appearance. I see no cases of typhoid but as many as ever of consumption. Tertian ague has been most common in adults, quotidian in young children. There was one fatal case of typho-malarial fever in an old man of sixty-five.

Granby, Dr. Edwards.—The first cases that originated here were of the marked remittent type, in the autumn of 1878, in a family living high up among the northern hills, near a clear-running brook; not marshy borders, but having a sandy, rocky bed,—mainly the latter. I have not seen a single case of regular intermittent, tertian nor quotidian, but plenty of cases of remittent and typho-malarial. Several of the latter have proved fatal. Malarial diseases are increasing. Most of the dams were built many years ago. Some small ones were constructed recently. All the streams are rapid. The pond is small. No flooded lands. The town is very hilly; the plains, about here are dry and sandy, with but few swamps. There have been no local changes capable of causing malaria, nor was any developed from the construction of the Canal road several years ago, as was the case along shore when that road was built in 1850 and following years. East Granby has similar local features. It has already been considered.

Simsbury, Dr. White.—Malarial fevers first appeared in 1878, in August, and have steadily increased since then in frequency. There has, however, never been as extensive a prevalence as in other parts of the town.

Dr. French states that he has seen but a few cases, and those principally on low ground, during the last year and a half.

Dr. Holcomb reports that the cases he has seen have been mild tertian ague, and among those living upon low ground mainly; only elderly and middle-aged persons have been attacked. I am confident there has been no obstruction to streams within the last five years that could cause malaria. The flooded lands are on rapid streams; in a few instances, the beds of ponds have been partially exposed for a part of the day, with offensive odors. Cerebro-spinal meningitis is indigenous; a mild form of tertian ague the prevalent type; there have been no deaths from any form of malarial diseases.

Tariffville, Dr. Sanford.—The first cases of intermittent occurred here in 1879; mild in form, and but few in number. There have been no changes in the town to account for it. The construction of the Connecticut Western road involved, it is true, considerable grading, but there has not, apparently, been any connection between this and the prevalence of malaria. Houses surrounded by high shade trees, and in damp localities, where the sun does not fully reach them, and damp, wet cellars, seem to be at least predisposing causes. Bilious, remittent and typho-malarial fevers are the most prevalent varieties; there is some quotidian ague, none very severe. The same agencies that have heretofore produced other zymotic diseases apparently now do the same for malarial diseases. As above stated, hepatic complications are common. About 5 per cent. of the people have been attacked, mostly people in middle life.

Avon.—The first cases occurred in 1875; intermittents, on low ground near the river. The Farmington overflows the meadows in high water, leaving stagnant ponds in places along its course. The flats are from one-third to one-half a mile wide, and covered completely in high water; in places that are lower than the general level water is retained for some time. Malarial diseases are increasing in frequency, and attack all ages; there have been cases of congestive chills and enlarged spleen; there was one death in 1880 from typho-malarial fever, a female between 10 and 20 years of age; no other deaths from malarial diseases reported before this; typhoid fever is less frequent. There have been no new agencies at work to induce the disease.

Farmington, Dr. Carrington.—The first case of which I have any knowledge was in 1875, occurring in a house built on a hill-side, remote from swamps or low ground, but a predisposing cause, without doubt was a wet cellar.* It was of the regular tertian form. During the past three years I had one case of typho-malarial fever, near the mouth of the main sewer from New Britain; the patient recovered, but afterwards died of purpura-hemorrhagica. During the construction of the new reservoir many of the workmen suffered from malaria, and since then there have been many cases in families living near by. In the southern part of the town the increased frequency may be influenced by the lowness of the brook.

Unionville, Dr. King.—The first case was in 1876; typho-malarial, on rather high ground, about sixty rods from the river. Malarial diseases are now rapidly decreasing in frequency, especially in comparison with the last two years, when they were extensively prevalent; since this marked decrease, typhoid fever and notably consumption have commenced to increase. The Farmington is a rapid river, and although there is a considerable daily fluctuation in its height, owing to the shutting off the water from the mill wheels at night, its bed has never been offensive; there have been no new dams built, nor old ones raised, of late.

The deaths in Farmington for the last three years from malarial diseases were five; cerebro-spinal meningitis has become indigenous, as generally where malaria prevails.

Bristol, Dr. Way.—Malarial diseases were unknown in this region, that is, so far as originating here was concerned, until six years ago, 1875. As nearly as can be learned, the first cases were of regular tertian intermittent, occurring upon a marshy flat, near one of the streams in the southwestern part of the town; the disease reaching us probably by extension from the valley of the Quinnipiac. Bristol lies mainly in a basin, cut out of the surrounding hills, many of which are quite steep and high. There is quite a rapid stream which flows through, rising in the

*This illustrates the theory of the influence of sub-soil moisture.

Burlington hills, and like the Farmington, into which it empties, in the town of that name, runs south and then turns and flows north again. There are several dams upon this, making small ponds, but the beds are for the most part rocky, and if dry in summer are not, as a rule, offensive. The stream fortunately is used but very little as a sewer, and hence is not itself a source of ill health. Most of the town is upon the plain, which can very easily be drained into the river. The soil is for the most part sandy, and water seldom stands long upon the surface. The cesspools never require cleaning to remove their fluid contents, which drains away so rapidly in the soil that almost the only objection to their use is the pollution of the sub-soil and the ground, air, and water as one would naturally infer. The greater number of cases are upon low land, although not wholly so; the hills have not escaped free, but proportionately to the number of inhabitants have suffered nearly in an equal ratio. The most of the cases of late have been of the mongrel malarial fever with the chill not well marked, and the ill-defined cases, called malaria, both by the people and the profession indiscriminately. My own cases have been limited to the flats near the streams and ponds. Typho-malarial fever has been unusually prevalent the past autumn, and I have seen one fatal case of what might be called congestive chills. I do not think any varieties of malarial disease can be considered as on the increase here. There have been no local changes, no obstructions to natural drainage that have not long existed unchanged essentially. Upon the stream mentioned there are, in its course through the town, thirty or more small dams. and the resultant ponds, small and shallow, but almost always full, or at least their beds are seldom wholly uncovered; their average depth would not exceed three feet. These numerous ponds and dams render sluggish a naturally rapid stream. According to my observation and belief, malarial diseases have prevailed here to a very limited extent; those affected have been between the ages of five and fifty years. As before stated, local causes are insufficient and inadequate to explain the present movement of malaria, so to speak; but some general cause or causes must be looked for, or some widespread agencies.

Burlington.—The first cases of intermittent that originated here were in the autumn of 1874, reaching this place by direct extension along the valley of the Farmington in the regular routine. The greater number of cases have been in the valley and near ponds and streams, but it followed the small streams up into the hills until finally it reached the summit of the very highest. Since then, it has prevailed more or less from year to year; the greater number at the commencement were in the valleys. The fatal cases have been few and mostly typho-malarial fever. The frequency has been increasing, but not rapidly, and there has been a steady extension to the north and east.

New Hartford, Dr. Burwell.—The first case of the class of diseases connected with malarial influences that came under my notice was in the autumn of 1879. The house stood on a decided elevation, although near the house was a large section of swamp land. It was a typical case of tertian intermittent, as I was informed. I have seen obscure cases with regular exacerbations and remissions that have been called malarial, but I have not seen myself any fully-developed cases of intermittent fever, indigenous to this place. There have been cases reported here and there since that date, but I have seen none. Near the Burlington line cases have occurred of true intermittent.

Canton.—There was one case of intermittent fever in 1870, and two or three the next year. These were of the regular tertian type, and were in the valley of the Farmington, along which it gradually extended, confined exclusively at first to the low lands, but approaching the hills each year, as it spread back from the river. In 1877, they were reported as "having become more abundant each year for the past few years, each year showing an increase over the preceding, as also in 1878, when miasmatic diseases of all forms, intermittent, remittent, masked, and in a few instances pernicious, have been slowly but steadily creeping over nearly the whole county. Suffield alone reported entire exemption from malaria in 1878, and its existence in Granby was doubtful. The increase was reported as rapid in all the east of the county, except Hartford, Farmington, and Bristol, where they were reported on the wane."* There were twenty-four deaths in the county from malarial diseases that year. In Canton there were five from typho-malarial fever in 1879, and also in 1880. Cerebro-spinal meningitis is also indigenous, cases recurring every few years; indeed that is generally true wherever malarial diseases are prevalent. Dr. Lewis of Collinsville states that there is no intermittent fever in Collinsville at the present time, and has been none during the past season. He is strongly inclined to question the origin of true intermittent in Collinsville, or in the town generally.

Plainville, Dr. Buel.—The date of the first cases that originated here is difficult to fix definitely; there were cases from 1873, more or less frequently; it is, however, claimed that in these earlier cases the disease was invariably contracted elsewhere. The first cases that I am conversant with occurred in 1876, and in persons living on the plains. There is a large artificial pond in the vicinity; the water is very shallow, and when the bed is exposed, and indeed at other times, it produces very offensive odors; in its neighborhood the cases of chills are more frequent, persistent, and severe. The frequency has been and is steadily increasing. The young and middle-aged are principally affected, though no ages are exempt. The tertian and latent varieties have been the most common; there has been some quotidian and mongrel malarial fever, and a few cases of congestive chills, rapidly fatal, the patient becoming comatose

* Proceedings Connecticut Medical Society, 1878, pp. 43-4.

at once, or in a very brief time. I find some evidence that malaria existed here soon after the early settlement of the place. There have been many local changes in the last few years; artificial ponds made, natural water courses disturbed, and drainage interfered with; dampness has been induced by dense shade from trees and shrubberies, so that a favorable condition has been afforded for spreading and increasing the malarial poison, if not for producing it. The land is a sandy loam; the streams sluggish.

Hartland.—There have been a few cases of intermittent fever in Hartland for a few years past; the exact date is a little uncertain, as the earlier cases are asserted to have originated elsewhere. This town is very hilly, almost mountainous; but in the deep valleys the first cases were found. There have been a few cases on very high ground among the hills, entirely away from morning fogs, streams, and marshes. There have, however, been but comparatively few cases; the population is mostly agricultural and somewhat scattered. There have been, as far as I can learn, no fatal cases.

Barkhamsted, Dr. Crosier.—Intermittent fever first appeared here in 1870, upon the low lands near the river. The most of the cases have been in the valley of the Farmington, but it has also extended to the hills. I have noticed that when the river is low, when the ponds are so low that the mills run only half time, then I get a great many cases of malaria, and it presents itself in many forms and varieties, the mixed and masked, dumb ague, and in modifications of the characteristic phenomena of other diseases. Malarial diseases are increasing very rapidly; tertian ague has been the ordinary type; there have been a few cases of congestive chills which proved fatal.

VALLEY OF THE THAMES AND TRIBUTARIES.

Lebanon, Dr. Barber.—The first cases of intermittent here were on low ground in the fall of 1878, near a large reservoir. The cases are mostly regular intermittent; some quotidian; have seen but one case of congestive chills. There were no unusual causes or any changes to produce malaria. The water stands along the sides of the main street in spring and fall, but there are no more cases than on high and dry ground. The dams were built ten or twelve years before malaria appeared; the largest reservoir is seven miles in circumference; was a swamp before it was flooded; the water, however, is seven or eight feet deep. When the pond is drawn off in the summer the exposed bed is very offensive. All ages are affected; children often. The frequency of typhoid has diminished; consumption unchanged.

If inadequate drainage is a cause we have it here, as from the nature of the soil the water is retained upon the surface for a long time. Malarial diseases have prevailed quite extensively here during the last three years, the frequency and severity increasing, but I think the number of

cases in the center of the town has been less during the past season, as the long-protracted dry weather has prevented the usual excess of surface water. I have seen one marked case of congestive chills, but have not met with any cases of malarial diseases that have been fatal. The quotidian and tertian agues are most common.

Bozrah, Dr. Johnson.—Until within a very few years there were no cases of ague known to have originated in this town, as I learned from my father, who practiced medicine here for a great many years. The first cases were of remittent fever, occurring upon low ground, and not far distant from a pond. The streams here are rapid, but not very shallow, any of them; the beds of some of the ponds are exposed and offensive in summer. There have been several dams erected here, flowing large areas, during the last few years. Malarial diseases are increasing rapidly; most of the cases are among the middle-aged. There have been of regular intermittent fever about twelve cases the past year, the majority of them among persons living near the ponds mentioned. The cases of irregular intermittent and dumb ague have been more numerous; there have been no fatal cases. So far as I can learn, malarial diseases were unknown in the early history of the place. As will be seen, we have not yet had any very extensive prevalence, but are in the outskirts of the malarial territory, not exactly on the boundary line, as there have been indigenous cases to the east of us in Norwich. There has not apparently been any decided influence exerted upon the frequency of typhoid fever.

Norwich.—There were a few indigenous cases in 1881 of well marked regular intermittent fever; previously to this there had been no cases originating here since the completion of the New London and Northern railroad, when there were about a dozen or so cases. The Thames river is apparently a bar to the further extension to the eastward. The Housatonic formed a similar barrier when malaria extended along a belt of land from New York State along the shore to that river in 1833, or about that time; such instances are not uncommon. Since their appearance last summer, the extension has been quite decided.

Montville, Dr. Burchard.—There were some cases of bilious remittent fever some years ago, but the first indigenous cases of intermittent fever were in 1879. Almost all the cases have been in the southern part of the town, along the course of the Oxaboxo and within 1½ miles of its confluence with the Thames river, and on the northern side of a large reservoir. The prevailing winds being largely southerly, nearly all those living in the valley have been affected. This reservoir flows a large area of low land, destroying a large amount of vegetable matter, as the pond is very shallow over a great part of its area. There was a considerable quantity of quite dense undergrowth, bushes, and the like, destroyed by the flowage. There are thirteen dams within six miles on the Oxaboxo, which is a small stream flowing through the southern part

of the town, and in its valley most of the malaria has occurred. I have carefully observed how rigidly certain forms of disease follow the course of this stream, and my conclusions have been verified by other independent observers. The ponds are almost always full, except in time of unusual drought, when, too, it is long prolonged. The river is 2½ feet deep on an average, and its current is slow from its frequent dams. Nearly every case was within sixty rods of this stream; none more than one-eighth of a mile distant. About 15 per cent. of the inhabitants of the village of Uncasville have been affected more or less. All ages are attacked, from four to eighty. A majority of the cases have been tertian ague; one case of double quotidian, and two of congestive chills. There have been from twelve to fifteen cases of typho-malarial fever, which first appeared in 1880, and has been the only fatal type. There has been no decided change of late in the frequency of these diseases; they are about stationary. There has been very little typhoid fever as compared with malaria. I have no theories in whose favor I am prejudiced, but have been carefully observant of the facts in the manifestations of malaria here.

East Lyme.—Intermittent fever first appeared here in 1876, during which year there were but two or three cases. Regular intermittent of the tertian type has been most prevalent; some quotidian ague and typho-malarial fever. The first cases were in the western part of the town, and malaria reached here from that direction. Since the first year of their appearance, malarial diseases have rapidly increased. From ten to fifteen per cent. of the population have been attacked, including all ages and conditions. Those living at a little distance from the shore are more liable, apparently, than those near the sound. There has not been as universal a prevalence as in many places to the west of us, nor is the increase at present as rapid as last year.

EASTERN BOUNDARY LINE.

Stafford Springs, Dr. Newton.—Intermittent fever has prevailed here to some extent for a year past, and the influence of the intermittent type has been felt upon all our continued fevers, and to some extent upon diseases generally. The history is very meager, as there has been so little of it as yet. The cases have been wholly confined to low, damp situations near ponds or streams.

Dr. Clark has not met with any cases in the town of Stafford that can clearly be considered as originating there. The approach of diseases of this type is perhaps heralded by the modifications of other diseases, and the increased value of quinine and other anti-periodics.

Tolland, Dr. Preston.—There have been no clearly-marked cases of intermittent fever originating in this town. There have been only one or two which could be considered as approaching that type.

Coventry, Dr. Dean.—During 1881 some cases of intermittent fever have originated in Mansfield, near the Willimantic river, and in this village a few cases, characterized by uncertain symptoms suggestive of chronic malarial poisoning, have been speedily cured by anti-periodic treatment. I am obliged to prescribe quinine more frequently than in the earlier years of my practice, but it is a question whether that shows an increase of malarial influence.

Coventry, Dr. Bennett.—My knowledge of Coventry extends over a period of sixteen years. I never saw or knew of a case of intermittent fever that originated in this place until within the last four years (1877) although I have seen its influence mixed with other diseases. The first two cases of true intermittent that I saw were in the same family, a lady and her child, who was about three years of age. They lived near the Willimantic river, on low ground, near the dividing line between this place and Mansfield. There was a large pond a mile and a half below the place. Neither of them had been out of the town for months, and could not have contracted the disease elsewhere. Most of the cases have been of the tertian type, but I have seen some quotidian, no other form. They have occurred for the most part near rapid-running streams, or near ponds or reservoirs. In one instance a lady had an attack during the last months of her pregnancy. The child also had the same disease, which showed itself well marked before it was two days old. This is the youngest case on record. Malarial diseases are increasing in frequency; many, however, contract it elsewhere. There have been but a few well-marked cases of typhoid fever. The frequency decreases as malarial cases increase. Have seen no effect upon consumption. Those in middle life are most subject to malarial influences. There have been no changes nor local causes to induce malaria.

Mansfield, Dr. Sumner.—The first cases that originated here were of typho-malarial fever in 1880, among persons living on low ground near the swampy borders of a pond. This pond is used as a reservoir, and was drawn down quite low. The next cases were near the Willimantic river, which was also very low from the long-continued dry weather. There have been but a very few cases, some fatal, however. Regular ague is increasing in frequency, and with this there is a corresponding decrease in the frequency of typhoid fever. There have been no other local causes, and these, excepting perhaps the effects of the unusually prolonged dry weather, have existed unchanged for years.

Dr. Johnson.—The first cases of intermittent fever that I treated were in the autumn of 1880, but they had spent some time in East Hartford and probably contracted it there. The next case originated near a pond used as a reservoir for manufacturing purposes. The pond, which had been very low for a long time, was at that time filled very rapidly. I saw no other cases that originated here until September, 1861, when there were three cases in one family which also lived near this pond. The pond

was again drawn down very low to repair the dam, and about as soon as it was filled I began to treat typho-malarial fevers, as were all of those that originated here. Most of the cases were pure typhoid. The pond, with its surrounding marshes, is apparently the cause, yet these same conditions have been repeated again and again, and no malaria has been developed.

Willington, Bolton, Andover, Franklin, Lisbon.

From this point the river forms the boundary. These towns have as yet felt but little, if any, effect from the malarial influence that has reached their boundaries. How long their immunity will last is an interesting question. The divide between the Connecticut valley and he valley of the Thames and its tributaries affords at present an effectual barrier until we reach the southern tier of towns, when we find malaria has invaded the western part of the valley of the Thames, from the southwest, by extension along the Sound, and thence spreading north and east. There have been a few cases in Willington the present winter.

Columbia.—There were a few cases of intermittent fever here in 1877. The cases were among people living near low, marshy ground on the river. Since then, there have been a few cases each year, but there has never been any general prevalence. With the exception of a few cases in the localities named, malarial diseases are unknown here. The town is somewhat thinly settled with an agricultural population, and there have been no general or local changes to induce malaria.

Sprague.—It is doubtful whether any cases have originated in the town. There have been many cases of intermittent fever since 1880, but generally among those that have worked in the brick yards of Hartford. There has been a decided decrease in the frequency of typhoid fever, and the influence of the "malarial wave" has been plainly felt upon other diseases, even if no cases have originated here. Opinion is divided; there certainly have been quite a number of cases of regular intermittent fever and of the quotidian type, but it is claimed that these cases all contracted the disease elsewhere, and thus far an incontestable case is difficult to find. We are clearly on the borders of the malarial territory.

Windham.—As nearly as can be learned, there have been a few cases near the Mansfield boundary, along the course of the river. The first cases of intermittent were in the autumn of 1880 and there have been a few cases since then, all upon low ground near marshy or undraind ground. Some influence has been exerted upon all diseases, indicating the approach of a change in the type of disease. Bilious diarrhea and bilious remittent fever were the more marked illustrations of this tendency. If ponds, dams, or reservoirs form or induce malaria, it is strange that Willimantic has escaped, so long as these conditions are very common.

New London and Waterford.—There have been a few cases in both these places, but no very general prevalence. Sporadic cases were reported in New London several years ago, and during the last year one death from intermittent fever is reported. It is a rather singular feature that New London, which was the limit of the eastward spread of malarial diseases in colonial times with one exception, Pomfret in Windham county, should be so now with one exception: Thompson in Windham county, the extreme northeastern town in the corner of the state, bordering on Massachusetts and Rhode Island.

While, with one exception, there has been no indigenous malaria reported east of this boundary, the remarks made concerning Willimantic would apply pretty generally, that is, there is some influence modifying the type of disease, increasing the value of quinine and other anti-periodics, and the frequency of bilious diarrheas, bilious remittents, and the decrease in typhoid fever; while that which continues has more of the bilious and liver complications than is ordinarily the case. Reports to this effect have not been infrequent over this region generally. Singularly enough, a town in the north-east corner of the state reports indigenous malaria as follows:

Thompson, Dr. Holbrook.—I have not observed distinctly-marked cases of malaria in this vicinity, in the form of intermittent fever originating here, until the autumn of 1881, when I saw less than half a dozen cases of quotidian ague. They appeared in low, marshy districts on the borders of streams and ponds, accompanied with many cases of acute neuralgias, hemicrania and the like, so periodic in character as to suggest the malarial element at once, and the cases always yielded to treatment specially adapted to malaria. It is worthy of remark that typhoid fever, once so prevalent here, is now excluded from the causes of sickness and death. And this latter fact is also true of the four towns bordering Thompson to which my practice extends, within a territory of eight to ten miles square, I have not once seen a case of genuine, well-marked typhoid fever for the last two years. In view of this, as there has been no cases of ague indigenous to these towns, whether it is just to attribute this decrease to the influence of malaria is questionable. Still, as malaria has followed streams in the western part of the state, from the mouth to the source, it would not be strange for it to do so here. Still, it is well to wait before deciding this question for further developments in both types. The returning frequency of typhoid fever in regions where malaria has long prevailed and the existence of both types, side by side, is extremely interesting.

During the past year, there is evidence that malarial diseases have been quietly extending their range beyond the formerly estab-

lished limits. For some time, reports have been made of the prevalcnce of bilious diarrheas, intractable ueuralgias, that is, to anything but quinine in large doses, and a general tendency towards at first remittent symptoms, and later the periodic type, was more clearly impressed. This year thc evidence is more unequivocal and almost invariably bilious diarrheas and bilious remittent precede, and then the malarial influence is shown upon typhoid fever, the characteristic fever of the region. In one or two instances, the malarial element is still more clearly displayed, as in Brooklyn where one death is reported from congestive chills as well as one from typho-malarial fever. In Eastford, one death is reported from typho-malarial fever in a person between ten and twenty. In all, or nearly all these places, cerebo-spinal meningitis had become endemic and was sometimes nearly as frequent as malarial fevers. Of course these fatal cases are indices of many more non-fatal and lighter ones, that occurred simultaneously with them in the same localities. In all probabilitiy, other localities in Windham county have been similarly affected.

RESUMÉ.

The various reports from the different towns represent the views held by their writers generally upon the influence of local causes in the production of intermittent fever and its related diseases. The report of Gen. Viele is a contribution from another standpoint, as well as a study of a special region. In the present paper the term malaria has been used as identical with the cause which produces intermittent fever and similar diseases, aud also to stand as a general term to include all forms and types of the disease itsclf; still, in thc connection in which it is used there is no occasion for confusion. In Viele's report, it includes all septic influences arising from filth and other disease germs, as well as those that produce malaria. The malarial and septic germs are often associated in such soils as are favorable to the multiplication of the malarial bacteriae, but it makes a rather broad field to include all polluted air under the term malaria, although, according to the derivation of the word strictly correct.

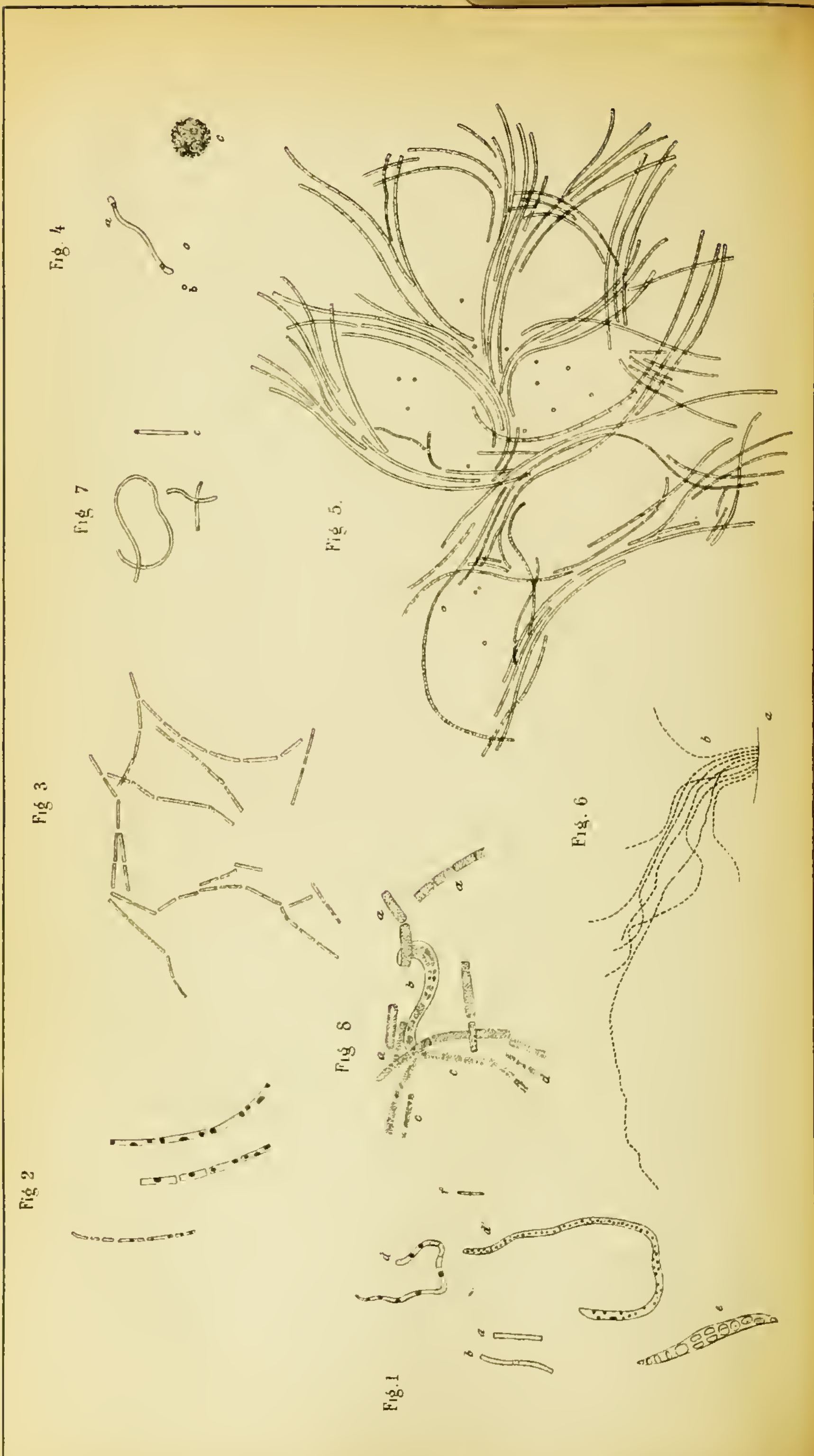
As shown by the historical sketch and the local histories, malarial diseases have existed either as epidemics or in sporadic cases during the settlement of the state with only very short intervals here aud there, and those, the indications are, might be bridged over if more correct knowledge could be gained of these periods, and a

detailed history. For periods varying in length, but about twenty years seems to be as often recurrent a period as any, there would be quiescence with only occasionally few scattered sporadic cases and a reappearance in an epidemic form at the end of the periods.

The vexed question of origin has already been somewhat fully discussed and the various theories presented. The latest theory to which any weight is attached, not the very latest in time, seems to be confirmed by the history of malaria in this state and in New England generally. I refer to the bacteria theory of Klebs and Crudelli. As before stated, while looked upon favorably, especially in Europe, this cannot be considered as proven; but there is much evidence in its favor. The essential conditions for the productions of this germ are those that the account shows to be the ones demanded to fill the conditions here, for we find it originating on the highest ground in towns, that is, if it originates locally at all; where there is little organic matter in the soil, no marshes nor vegetable decomposition, and never has been. In fact there have been cases originating in the high sandy soil of Southwick in Massachusetts and in similar localities in this state. As there has been so much interest in the theory of the production of malaria by a special form of bacteria, the *bacillus malariæ* and there is so much probability of truth in the germ theory, even if this special form be not the one or only one that produces malaria, its causation by bacteria of some kind seems almost a settled conclusion. Moreover, if not true, as the bacterial origin of splenic fever has been proven and that of some other diseases, a general knowledge of the forms and appearance of this class of organisms seemed desirable.

The plate of Crudelli is here reproduced which best illustrates this subject. This belongs to the rod-like class, as will be readily seen the bacillus resembles a small rod. The spores are shown in several of the figures, scattered free in Fig. 5, in Fig. 4. b, and contained in the developed bacteria. The *bacillus malariae* is a small rod-like body containing often a spore at each end, and sometimes one in the center also; it grows into long curved and tortuous filaments, and divides into joints as shown in the plate, forming chain-like groups, as in Fig. 6.

The following laws of development of the *bacillus malariæ* coincide very closely with the history of the disease in Connecticut. 1. The spores are often found in soils very poor in organic substances. 2. These malarial soils are sometimes met with in places that are



THE MALARIAL BACTERIA, BACILLUS MALARIÆ,
after Klebs & Crudelli.

not swampy and never have been so. 3. A temperature of about 68° F., a moderate degree of permanent humidity and the direct action of the oxygen of the air on all the parts of the mass, are essential conditions for the development of the spores in malarial soils ; if these conditions are absent, the multiplication of the malarial ferment will be arrested and also the development of the spores. Malaria is often engendered on very high lying grounds and is not necessarily connected with marshes, stagnant pools or the admixture of fresh and salt water of the sea. A very slight degree of humidity serves for its production. The spores of the *bacillus malariae* have the power of independent motion ; they strongly refract light, hence appear bright and shining under the microscope ; they are nearly round in outline, a little oval rather than completely spherical. The spores develop into long filaments which at first are homogeneous ; later they divide transversely into a chain, and in each link a new one develops ; after awhile the whole interior becomes filled with spores, which appear first one at each end, then one in the center. The greatest developement in animals is in the spleen and the medulla, or marrow of the long bones as proved by experiments. This is characteristic of the malarial poison which affects the spleen and the bones especially.

The following is the description of the plate :

Fig. 7. A tortuous filament and two transverse filaments, all homogeneous, c, bacillus with a terminal spore at each end from clay.

Fig. 1. Specimens from the same clay ; a, a small rod without division ; b, one with a transverse division ; d d′, long tortuous filaments containing many spores of bacillæ with terminal spores ; e, a foreign body.

Fig. 2. Articulated filament very highly magnified ; the two larger show the small rods and spores distinctly ; they are all the same, two more highly magnified and enlarged at least 1800 times, probably more. These are all from clay.

Fig. 3. Articulated filaments less magnified than in No. 2.

Fig. 4. a, Bacillus with two terminal spores ; b, free spores ; c, a lymphatic cell, these are from the serum of a rabbit.

Fig. 5. A group of filaments, some homogeneous, some articulated free spores.

Fig. 6 A group of chain-like filaments not highly magnified.

Fig. 8. Filaments from various sources: a, a, a, articulated filaments filled with sporules; b, division of granular masses contained between articulations; e, d, first indications of such divisions.

It is evident from the preceding accounts that the marsh miasm theory of the causation of malaria is insufficient to explain its prevalence and spread in Connecticut. and that vegetable decomposition does not play so important a part as has usually been assigned it. Whatever influence these agencies may have in favoring the continuance and severity of malaria, and their action is by no means uniform even in these respects, the origin is due to other agencies. The old ideas of altitude, too, are sadly confused ; high ground was formerly supposed to be malaria proof, but as can readily be seen by consulting the town reports, in many instances the highest land in the town was first invaded ; in many others the high hills have suffered more than the valleys and lowlands, while in nearly all the high plateaus and lofty hills were sooner or later reached. The Roman Campagna has already been mentioned and the illusion dispelled that allowed its use in support of the marsh theory. * The admission that malaria can and has originated *in Colorado*,† and the cases from the rocky mountains mentioned by Prof. Chadwick, together with the high lands in vaded in this state so frequently and oftentimes primarily, also in some instances in Massachusetts, are difficult facts to explain by the old theories. That malaria is not limited to certain altitudes and is not found above certain heights can no longer be maintained, whatever is held concerning other points. On the other hand there are no such objections to the germ theory, nor to the special form which has been illustrated, that is, the production of malaria by the *bacillus malariæ.*

By this theory the absence of malaria, when local conditions favor its existence and spread, is accounted for by the absence of the germs or spores that produce it; unless its origin *de novo* where the proper conditions are found be admitted, which is a considerable step in advance of present ideas. From the local histories we see the most widely differing conditions exist where malaria prevails. Here we find it for years under conditions formerly supposed the most adverse, and then persistently absent under local conditions and surroundings the most favorable for its production under the marsh miasm theory. Some marshes are surrounded with malaria, and others are not even where other portions of the same town are invaded. These and similar facts seem to offer insuperable objections to the marsh theory. But aside

* See introduction to this article, page 134.

† Transactions Colorado Medical Society, 1881, pp. 83. *et seq.*

from all opinions as to its primal causation, there are some more general laws and widespread agencies at work in the development and spread of malaria over New England. We know so little concerning the laws of epidemics that it is useless to speculate here. Whatever weight the opinion may have that the stamina of the race is deteriorating, and that we yield to agencies that our fathers resisted, it is not broad enough to cover the whole ground. There is apparently under all these local manifestations some general law which controls the onward march of the disease, and a periodicity in its recurrence that is somewhat outlined in the periods of twenty years or very near, to that period, so often the date of its reappearance as an epidemic.

There is, however, one law apparently without a single deviation scarcely, and that is that it follows water courses, the sound, rivers, brooks, small streams even to their springs, and is quite as often found more prevalent to the windward of some pond or other body of water. In its course along the sound it has followed up the rivers to their source oft-times and their tributaries, even to the ponds or springs from which they start. From the streams it spreads back into the country east and west, north and south. The sporadic cases are more difficult to account for, as in any disease. As a rule the greater number of cases are in the valleys and lowlands, and, as before stated, near water; but there does not appear to be any very decided difference in favor of water polluted by vegetable decomposition. The bottom lands along rivers that retain moisture, even during a long heated term, are also favorite locations. There are no localities exempt, as cases are found in all and under all conditions, and among the most diverse and varying surroundings; still there are more cases, a more decided persistence, and a more marked severity near water courses and upon the lowlands generally. The only variety that is apparently much influenced by vegetable and organic decomposition is typho-malarial fever which is more often associated with filthy surroundings. The hills are more commonly invaded later than the lowlands from the gradual extension of these diseases back from the valleys, and in the northwestern part of the state, there are fewer cases among those living upon the hills, and many hilly regions are wholly exempt. There are several adjacent towns where there have been but very few cases of malaria, although the adjacent regions on every side have more or less; these are all on high ground, the highest in the state. On the other hand, in

other parts of the state ; those living on the hills have been first attacked, and have in general suffered more than those living in the valleys and upon the low lands. It would be difficult to select any locality and declare positively that the conditions would produce malaria ; nor can you predict safely concerning the freedom of a place from malaria from the conditions it presents.

The evidence, too, is conflicting as to the influence of dams and the ponds thus caused. In some instances they are reported as a preventive of malaria, which disappears when land is flowed ; this, however, is more often the case when a dam is carried away and then restored. In general, I think it can safely be stated that damp bottom lands subject to annual overflow, lakes, and artificial ponds, are as well as natural water courses favorable to the existence and continued prevalence of malaria, and favor also its tendency to become endemic when once introduced. The same may be said of the obstructions to natural drainage caused by railroad embankments and gradings. Extensive upheavals and overturning of earth are likely to be favorable, if the soil contain the spores or germs that produce malaria, which like the germs of other diseases may preserve their vitality for long periods when buried.

INFLUENCE ON OTHER DISEASES.

In general the first intimation of the approach of malaria is a change in the character and type of other diseases. They assume a more or less periodic type. Quinine and similar remedies exert a much more decidedly beneficial effect. The frequency of typhoid fever decreases, neuralgias and bilious diarrheas are more common. When fully established, almost all diseases have a malarial complication, and we have malarial bronchitis, and so on through the list. Cerebro-spinal meningitis has also become endemic in nearly all the malarial region. Typho-malarial fever takes the place of typhoid fever generally. After a certain period congestive chills appear, although in some instances both typho-malarial fever and congestive chills appear early, but as a rule malarial diseases do not figure largely upon the mortality lists until prevalent for some years. When decreasing, the intermittent type becomes less plainly marked. There are more of the masked and irregular types ; the mongrel malarial fever with well-marked chill is more common. The influence of malaria upon the production of insanity is marked. Some cases are attributed entirely to this cause, and a maniacal excitement accompanies some forms. Its influence upon tem-

perance is unfavorable. Laboring men are attaked by a disease that destroys their appetite and digestion. For the time alcoholics are resorted to, to tide them along and enable them to work; thus a habit is formed, too strong in many instances to be overcome. The following table shows the mortality from typhoid fever and malarial diseases for the last twelve years in this State.

1869,	Deaths	from	Typhoid,	458	Malarial,	9
1870,	"	"	"	427	"	15
1871,	"	"	"	352	"	19
1872,	"	"	"	506	"	29
1873,	"	"	"	430	"	30
1874,	"	"	"	370	"	38
1875,	"	"	"	449	"	21
1876,	"	"	"	327	"	22
1877,	"	"	"	321	"	73
1878,	"	"	"	252	"	143
1879,	"	"	"	159	"	198
1880,	"	"	"	242	"	265

Typhoid fever reached its maximum in 1872, its minimum in 1879; malarial diseases their maximum in 1880, and probably will show an increase in 1881. The rapid increase in the mortality for the last three years is noticeable. There was a marked increase in the frequncy of typhoid fever in 1880, which still continues; a similar fact was noted in Massachusetts. During the past year typhoid fever, intermittent fever, and typho-malarial fever have often existed side by side almost, that is, in the same town and neighborhood. There has been no uniform influence exerted upon consumption; locally increase and decrease are reported, but as the general mortality has remained unchanged in the state, and the percentage to other causes is not changed, it is safe to say that no general influence has been exerted. Typho-malarial fever has beeu very common, often epidemic. Its onset is more sudden aud sharp than typhoid; there is no evideuce that it is conveyed by the dejections, as in typhoid; diarrhea is not always present. The eruption is different, a sudaminous eruption, that is, of small watery pimples, is characteristic but not always present. The temperature range is higher, and in typhoid would indicate a fatal result; there is a period of high fever once or twice during the day, with or without a chill or cold stage; nausea and vomiting are common symptoms, the convalesence is tedious, and often tertian ague is

left. The patient does not fatten up a year or so after as is often the case after typhoid.

Thus we have seen that intermittent fevers were indigenous in the early settlement of the state, that, with brief intervals of quiescence, epidemics have from time to time recurred in different parts of the state, but that the present outbreak is much more general and persistent than any preceding one, and has already extended over a large part of the State, in general following river valleys by preference, and has also extended along the principal river valleys into Massachusetts, and, as in this state, has spread back from the rivers into the surrounding territory, and that during the last year it has appeared in several parts of the eastern counties before exempt, and also in Rhode Island. It has continued so long in certain localities as almost to be entitled to be called endemic.

The theory of its causation by marshes and vegetable decomposition has been seen to be inadequate to explain the phenomena of the disease in this State and in New England generally, while the germ or bacteria theory presents a better explanation and is not contradicted or opposed by any of the manifestations. It also appears that while local conditions have no doubt exerted an influence upon the persistence, recurrence, and severity of the disease, and upon the prevalent types, they are inadequate to explain the whole phenomena; that there are broad and general laws governing the present outbreak, determining the epidemic periods, and controlling its development and spread. The rate of progress is so extremely variable that it is impossible to give any definite rule. From two to thirty miles a year has been assigned. The sporadic cases and its erratic leaps render all calculations of small value.

As to means of prevention, the only measures that have been successful here, on a large scale, have been those relating to the thorough and systematic drainage of the subsoil or ground-water, and that, in accordance with the theory of the development of the malarial germs, this measure promises the best results. It also appears that the retention of moisture in the soil favors the production of malaria, hence dense shade, which induces dampness of the soil, would require removal in order to secure complete exemption from malaria. Whatever theory may be held, the evidence is pretty conclusive that systematic drainage is unfavorable to the development and spread of malaria. The reservoirs and ponds in this connection do not appear as deleterious as soil-moisture.

MALARIA

IN

WESTERN CONNECTICUT.

GEN. EGBERT L. VIELE,

OF NEW YORK.


MAP
Showing DRAINAGE AREA of Rivers
in
CONNECTICUT.
Scale of Miles.
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Drawn for the Connecticut State Board of Health :
THEODORE G. ELLIS, C.E.
Am Photo Litho Co N.Y.
MASSACHUSETTS
BERKSHIRE
HAMPDEN
WORCESTER
DUTCHESS
PUTNAM
WESTCHESTER
PROVIDENCE
KENT
WASHINGTON
RHODE ISLAND
LITCHFIELD
HARTFORD
TOLLAND
WINDHAM
NEW HAVEN
MIDDLESEX
NEW LONDON
FAIRFIELD
LONG ISLAND SOUND
Fisher's Island
Fisher's I. Sound
Folkners Island
HOUSATONIC RIVER
CONNECTICUT RIVER
THAMES RIVER
QUINEBAUG RIVER
SAUGATUCK RIV.
NEW HAVEN
NEW LONDON
NORWICH
MERIDEN
MIDDLETOWN
BRIDGEPORT
WATERBURY
DANBURY
WINDSOR
GLASTENBURY
MANCHESTER
PUTNAM
KILLINGLY
SALISBURY
GREENWICH
STAMFORD
GROTON
STONINGTON
LEDYARD
PRESTON
COLCHESTER
GUILFORD
MADISON
CLINTON
WESTBROOK
OLD SAYBROOK
OLD LYME
EAST LYME
WATERFORD
MONTVILLE
WALLINGFORD
CHESHIRE
BRISTOL
FARMINGTON
BURLINGTON
GRANBY
HARTLAND
SUFFIELD
ENFIELD
SOMERS
STAFFORD
UNION
WOODSTOCK
THOMPSON
POMFRET
ASHFORD
MANSFIELD
WINDHAM
LEBANON
FRANKLIN
CANTERBURY
PLAINFIELD
BROOKLYN
HAMPTON
CHAPLIN
WASHINGTON
WARREN
KENT
SHARON
GOSHEN
CANAAN
NORTH CANAAN
WOODBURY
ROXBURY
BRIDGEWATER
SOUTHBURY
NEWTOWN
EASTON
WESTON
WESTPORT
FAIRFIELD
ORANGE
WOODBRIDGE
BRANFORD
NORTH BRANFORD
DURHAM
HADDAM
EAST HADDAM
CHESTER
KILLINGWORTH
PORTLAND
CROMWELL
BERLIN
ROCKY HILL
WETHERSFIELD
BLOOMFIELD
SIMSBURY
CANTON
AVON
NEW HARTFORD
BARKHAMSTEAD

REPORT ON MALARIA IN WESTERN CONNECTICUT.

BY EGBERT L. VIELE.

The presence of a wide-spread epidemic of malarial disease, extending over a large portion of the State of Connecticut for a succession of seasons, is naturally a source of intense interest to the people at large, and a subject of thought and discussion for the Medical Profession, and the Health Authorities of the State. Having been requested in this connection by the State Board of Health to make a sanitary examination of the territory adjoining Long Island Sound, and that bordering the Housatonic River, I submit the following Report, premising that the brevity of the time allowed for my examination necessitates a certain amount of generalization, where more detailed investigations might have produced results of a greater local importance.

EVIDENCES OF MALARIAL INFLUENCES.

The existence of malarious conditions in many portions of New England since the first settlement of the country is a well-known and undisputed fact, although its marked prevalence has only been recognized and noted at certain not well-defined periods. In the earlier days its presence was undoubtedly due to the rapid destruction of forests, and the general up-turning of the soil; but the gradual drying and cultivation of the ground eliminated the chief element of disturbance, and a more normal condition of the atmosphere resulted in a comparative cessation of the evils. More recent periods, in which morbific influences have prevailed, have occurred under entirely different circumstances. Agriculture has in a measure given place to manufactures. Farm lands have been converted into villages. Villages have grown into cities. Common roads have in a large degree been replaced by railways. Population has increased in a rapid ratio. The habits, manners, and customs of the people have also been materially altered. It

is under these later conditions that the recent observations of malarial influences have been made, and to causes growing out of them we must look for their origin.

It appears from the reports of local physicians that malarial diseases, more especially intermittent fevers, have been prevalent for several seasons throughout the western portion of the State, particularly along the shores of Long Island Sound, and in the valleys of the Housatonic and Connecticut rivers, and their tributaries. It appears further, that these malarial affections have exhibited a progressive movement eastward and northward, and have developed an epidemic character at different periods of time. It still further appears that there have been local causes, which, if they did not originate, have had a tendency to intensify and diffuse the malarial poison. These facts constitute the basis upon which my examination was commenced.

As far back as the beginning of this century, malarial fevers prevailed in the Housatonic valley. Again in 1828 fevers appeared along the Sound, coming from the southwest, but did not cross the Housatonic river. After a continuance of four or five years there came a period of immunity, the diseases reappearing however, in about twenty years. Reports on this subject made during the last thirty years and information gathered from reliable sources, exhibit many interesting and suggestive facts that are valuable in discussing the questions involved.

A carefully prepared table* by Dr. Chamberlain shows the progressive development of the malarial poison, eastward and northward. Assuming the general correctness of the data, I began my examination along the line of the New York, New Haven & Hartford R. R., commencing at the Harlem river. It should be here premised that this railway was one of the earliest roads constructed in this country at a period when there was less confidence in railway securities than there is at present, and serious difficulty in obtaining the money required for its construction. Hence the necessity for this construction to be done at the mininum of cost. For this reason, the general level of the railroad was maintained as near tide-water as possible, to save expensive grading. The consequence has been that innumerable water-courses have become obstructed, and the free flow of water on low ground everywhere along its route has been prevented. The result is a marsh or swamp for an average of every half mile from the Harlem river

* See pages 146–147 of this Report.

to New Haven. It is a well-established fact that marshes are especially favorable to the development of malarial poison, and may generate it for an indefinite period of time. Hence, it is not difficult to account for the presence of malarial fevers along this railway from the Harlem river to New Haven.

The Housatonic railway meets the New Haven road at Bridgeport, and follows the route of Trumbull river, which it ascends, until it crosses into the valley of the Housatonic. Along the line of this road from Bridgeport to Newton Station there is almost a continuous swamp. How easy, therefore, to account for the presence of fevers along the route of this road. The reports, however, show that the development of the fever poison has not been confined to the line of the railway, but has extended into nearly all the towns and villages of the western portion of the state. It thus becomes necessary to look further than the railway for the cause of the manifest increase in the intensity and volume of the malarial poison. To this end, I have made a sanitary examination of several of the cities, towns, and villages that are enumerated in the reports made to the State Board of Health, commencing with Stamford.

STAMFORD.

The village of Stamford has about 10,000 inhabitants, a good water supply, but no system of sewerage.* Like most of the towns along the Sound, its natural drainage is excellent, and also like many of these towns, this natural drainage has been interrupted in its flow. A stream called Mill River runs through the heart of the town, which has been obstructed in two places by dams, and a woolen-mill uses the water stored in a large pond formed by the upper dam. The pond has created a considerable area of saturation, and receives a good deal of surface drainage. The result is an accumulation at the bottom of the pond of a large amount of refuse and offensive organic matter. When in a season of drought, or for any other cause, the water in this pond is diminished, this decomposing matter is exposed to the action of the sun, giving out fetid and disagreeable odors. It is stated by physicians that during the past season the water in this stream was so low that there was very little water in tho pond, almost the entire area of several acres in extent being uncovered, exposing a black mass of decomposition, offensive to every sense, and that with very few exceptions the

* See description of the movement for sewerage in this report, page 37, *et seq.*

residents in the immediate vicinity were attacked with malaria in some form or another.

A second dam, below the one referred to, seems to have no other use than to obstruct the free flow of the water, both tidal and river, and produce an accumulation of decomposing matter.

The section of the village in the neighborhood of what is known as "the canal" is also in a bad sanitary condition. This canal, which was originally the enlargement and deepening of an estuary, was obstructed by the construction of the New York and New Haven railroad, and that portion north of the railway has been gradually filled with refuse until it has become a seething mass of decomposition. In the vicinity there is also a good deal of low, wet land that is in almost as bad a condition as the old bed of the canal. The railway has been more or less au obstruction to drainage along its whole course through the village. The low level of the track has unfortunately had a controlling influence on the grades of the streets, which it crosses, preventing the free flow of surface water, and maintaining at a low level those sections of the different towns through which it passes.

In the case of Stamford this low level of the railway will interfere materially with a proper system of sewerage. That some sewerage and drainage system should be determined upon at once in Stamford there can be no question, nor can there be a doubt that the present status of Mill River should be attended to without delay, if the village is to escape an epidemic of disease, even more serious than the one it has passed through last season. The value of this mill privilege for a decade is less than its annual cost to the public health. Furthermore, the soil everywhere is undergoing a gradual but certain pollution, from the use of out-of-door privies and cess-pools, aggravated in some instances by the conversion of drains into sewers.

The sanitary improvement of Stamford is by no means a difficult or expensive matter, if done properly. Its necessity and its value cannot be exaggerated. Its neglect is not only a present evil, but a greater wrong to the future population. Polluted soil requires years of time to purify, and a continued use of cess-pools will inevitably result in such a condition of things that the most serious consequences may be anticipated.

BRIDGEPORT.

The city of Bridgeport has exceptional natural advantages for salubrity, which as a general rule have been understood and appreciated by those under whose control its development has taken place. The streets and avenues are well arranged in plan, have been laid out and maintained with judicious skill, and the greater portion of the city has an air of extreme neatness, as well as thrift and prosperity. But, as is always the case in sanitary affairs, the exceptions to the general rule have a tendency to overcome all these advantages. This tendency is now making itself manifest in the wide-spread malarial influences that have exhibited themselves. The sanitary reports, confirmed by physicians and dispensers of drugs, go to show that malaria is prevalent in several most positive forms; and in addition, that malarial complications appear in numerous affections; not in themselves malarious in their origin. Of course, there must be some assignable cause for this, and it is not necessary to look very far for it.

Topographically, the site of Bridgeport is similar in character to all the towns and cities on the seaboard side of the State. A rolling, irregular surface, rising towards the north, and terminating at the south in rocky spurs and indentions, with water-courses on the east and west, draining marshes, ponds, and lakes within and beyond the city limits. What is known as Ash Creek forms the westerly boundary. This stream drains a long and narrow area and for a considerable distance is very tortuous in its course. There are several ponds on the line of the stream, one of them—Moody's Mill-Pond—is the locality where malaria first developed itself in 1861. The drainage of Mountain Grove Cemetery finds its way into this stream. There is a tract of low, swampy ground between Burr and Fairfield avenues, that is also imperfectly drained into the same stream; but this drainage is much impeded, and has undoubtedly resulted in the development of malaria. Along the line of the New York and New Haven Railroad, west of Burr avenue, this marsh is rank and offensive. The remedy for this is so simple and inexpensive as to make it a matter of surprise that it should be neglected, especially as the prevailing winds are towards some of the finest built-up portions of the city. Cedar Creek is the next drainage stream to the east. Its bed has been filled in to a large extent, and must at some time require attention. The most for-

midable elemeut in the sauitation of the city that has to be dealt with is the stream called Pequonock River, that runs through the easterly portion of Bridgeport. A good deal of recklessness has been displayed in the treatment of this water-course, that is likely to prove very injurions to the public health. It has been dammed up and obstructed in several places, uotably in forming the "Berkshire Mill-Pond." The dam at this point has produced a considerable area of saturation, and at a low stage of water, when the bottom and sides of the pond are exposed, malarial emanations must unquestionably be highly inteusified. The difficulty has been increased by the grading of River street, that has shut off the drainage of lands formerly overflowed by the pond, and created a large amount of stagnant water.

Another, and a very serious, difficulty in regard to this stream is presented in the fact that its bank for some distance has been used as a dumping ground, and by this means a large portion of the bed has become rank with refuse matter, the borders of which nourish a noisome vegetation, and at low tide emit a most offensive odor. The same is true of the "Yellow Mill-Pond" on the easterly limit of the city. Over this body of water the N. Y. & N. H. R. R. and Barnum avenue have been graded, with culverts to permit the flow of water; but this flow is not sufficient to carry off the refuse that is dumped into it. The consequences are too apparent to need description.

In addition to these focii of malaria, there are low and undrained spots in different parts of the city, that unfortunately have also been selected or used for dumping grounds. One of the peculiarities of all communities is that a good dry spot is seldom selected as a place for dumping refuse ; but a wet place, where it may more readily ferment and decompose, is almost invariably chosen. The supposition probably is that these low grounds will thus be gradually filled up, and in the meanwhile are good for nothing else. How well it would be if the effect in the future could be better understood, since such spots will always remain the lurking-place and nidus of disease.

Bridgeport has a good water-supply, and, so far as it has been extended, has a fair system of sewerage ; but the Sixth ward is laying up a retributive supply of typhoid fever and persistent malaria, with its numerous privies polluting the soil in the immediate vicinity of wells, aud the reckless scattering of refuse in all directions.

While the city as a whole is so attractive, and with its Seaside Park and surrounding villas so beautiful, a very little thoughtfulness and care, and a comparatively slight increase of public spirit, which its citizens have already displayed with such commendable taste and liberality, will remove from its limits the taint which, if neglected, may at some future day undermine its prosperity. The storage reservoir of the Bridgeport water-supply has been constructed without a due regard for the purity of the water: a great deal of the vegetable matter was allowed to remain in it, that by gradual decomposition will, I fear, produce serious results, if it has not already done so.

NORWALK.

Norwalk has all the advantages, as well as the disadvantages, of other localities on the Sound. While the better class of residences are attractive, and the streets and avenues on which they are built are, as a rule, maintained in an excellent condition, the inferior buildings, and the streets in their vicinity, are precisely the reverse. Generally these latter are on low ground, where all the refuse of the place seems to gravitate, as if under the influence of a general law. Norwalk and South Norwalk are distinct places under differently organized local government; yet they are connected together by a continuous line of improvements. Nearly all the dwellings are detached, and many of them are elegant villas of a high order of architecture. Each of these two places has a separate water-supply; neither of them has a definite plan of sewerage, a grave error under all circumstances, since a water-supply without sewerage increases the volume of putrescence in the cess-pools, and of necessity increases the pollution of the soil to an alarming extent.

In looking for the cause, I find the surface of the town to be very irregular, with many pockets, or depressions having no outlet. These, of course, hold the water that descends into them from every side, until it becomes stagnant; or if it sinks into the soil it remains there in suspension, giving rise to unwholesome vegetation, and chilling the surrounding atmosphere. "Norwalk river" runs through the town, and has a number of streams emptying into it, along the course of which are obstructing dams, with marshes and stagnant pools. Over these streams, and over the river, privies are built, polluting the water and forming offensive and dangerous deposits on the banks. The courses of the

tidal estuaries along the Sound are impeded; the narrow culverts obstruct the overflow, causing accumulations of decomposing matter. exhibiting in many places an offensive appearance, and exhaling offensive odors. Within a stone's throw of the railway station at South Norwalk are two stagnant pools that are breeding-places of malaria, and the locality where some of the most tenacious cases have occurred.

The practice that I observed in several instances of allowing house drains to run into the gutters of the roadways is to be reprehended. The malaria that has invaded this place has not come without invitation. The greater portion of the houses are detached, having court-yards and shade-trees, all of them, as a rule, being provided with ample verandas. The custom has become general among the residents of spending a large portion of the evening out of doors during the warm months; and for this reason the atmospheric influences have been more universally felt. Such habits can only be safely indulged in a region where the air is exceptionally pure, and where there is not even a suspicion of supersaturated soil. The health of Norwalk would be radically improved by being properly sewered. In order to be effective this should be well considered, since more harm than benefit may come of it. There has been a good deal of discussion as to the relative merits of different "systems of sewerage." The truth is that a so-called "system" is not strictly applicable to any locality. Circumstances and good judgment must be the guide.

NEWTOWN AND SANDY HOOK.

Newtown occupies a much more elevated position than the towns thus far described. It is in the interior of Fairfield County, and is removed from the influences of tidal estuaries, whose pollution has had such serious effect along the Sound. But the elements of obstructed water-courses, and undrained swamps have here brought the usual results. There has been a very general prevalence of intermittent fever in the town. Newtown village, of about 400 inhabitants, occupies an exceptionally fine site with but little that is deleterious in its immediate vicinity. Near the railway station is a dam and mill-pond, once used for the purposes of a hat-factory, but now serving merely for an ice pond. The water in this pond was very low during the past season, and a large portion of the sediment in the bottom was exposed

Sandy Hook in this town, about the same distance from the

railway station as Newtown village, has about 1,500 inhabitants, and is the locality of the New York Rubber Co's works. The "Pantatook river" is here dammed at several places, at one of which a considerable marsh is produced. The precipitous sides of the stream at the Rubber works prevent soil-saturation by the Mill Pond at that point, but below these works a dam erected for an insignificant saw mill has done a good deal of mischief; and the buildings,—half stables, half dwellings that are occupied in this vicinity exhibit an unusual amount of squalor and filth.

The construction of the N. Y. and N. E. Railway through this town has by the turning up of fresh earth, and the obstruction of the free flow of water, especially at Hanover pond, been undoubtedly a prime source of disease. There has never been any attempt at drainage, or any other public improvement, except the working of the roadways. The drinking water is from wells; while privies are promiscuously scattered around. Refuse is left to take care of itself. The factory population will soon need better sanitary care.

Accepting the foregoing as samples of the sanitary condition of some of the towns in the Western portion of the State, they illustrate the need of a general system of sanitation that seems to be imperatively demanded. In examining into the causes for the successive outbreak of malarial diseases that have occurred, it seems to me that the question has ceased to possess a merely local interest, but has became one of serious moment to the entire commonwealth. So wide-spread and general have the ravages of the insidious diseases extended, that it is no longer a matter with which localities can singly contend, but one which requires the resources and energy of the State to evolve and determine a general plan of relief to meet the exigences that have already arisen, and may hereafter develop themselves. The testimony of physicians and experts; the records of vital statistics carefully compiled and classified; the experience of thousands of individuals, all proclaim the very general presence of a powerful morbific agent, that seems to involve the interests of the whole State, since, although there are sections that have been comparatively exempt from this visitation, it is impossible to say when and under what circumstances the disease may invade that entire area.

It is therefore not out of place to discuss the remedies to be suggested for these evils from this standpoint, as in all probability any plan of relief will require to be general in character and appli-

cation. Taking the State as a whole we find that physically it belougs to the Appalachian Chain, two prominent ridges of which find their culmination respectively in the Green Mountains of Vermont and White Mountains of New Hampshire, descending to the southward in parallel lines through Massachusetts and Connecticut, and terminating at Long Island Sound. These parallel ridges are separated from each other by the broad valley of the Connecticut, dividing the State geologically and topograpically into the Eastern and Western sections. Each of these two sections has its owu separate and distinct physical characteristics, including a system of drainage. The Western section is drained by the Housatonic and its branches, the Eastern by the Thames and its tributaries. This drainage, however, is in a large degree imperfect, the natural difficulties being augmented by artificial constructions intercepting the courses of the tributary streams throughout nearly their entire length. The enormous extent and character of the obstructions to drainage, both natural and artificial, can only be understood by a reference to the circumstances that have determined the topography of the State, and a description of the peculiar features of that topography.

The several geological epochs during which the surface of the State was elevated and broken into hills and valleys, were the same as those which constructed the greater portion of the continent. First, the upheaval of the primitive rocks into long, high ridges and peaks. Next, the deposition of the secondary rocks, followed by the irruption of the trap through the sandstone; and this succeeded by the glacial and diluvial action that broke down the ridges, rounded the hills, formed the plateaus and basins, and gave to the water-courses their channels. Last of all, the alluvial deposits in the ancient river beds.

These great natural operations created the terraces, ground up the rocks into fragments, depositing beds of impervious clay in the deep hollows between the hills, subsequently to be converted into swamps and morasses, whose overflow forms the thousand tributaries of the rivers that bear their flood of waters to the sea.

Here, in brief, we have the ground-work upon which a commonwealth has been erected, on which its industry has been expended, and from which its wealth has been derived. One glance at the map, however, shows where disaster is mingled with thrift and prosperity. Every town is cursed with at least one swamp, and some with many. These swamps are in the basins that have been

referred to, and have no natural drainage, *except for their overflow.* Deep accumulations of supersaturated soil, whose rank decomposition is a perpetual source of miasma, alluvial beds of ancient rivers that have receded and diminished in volume, forming brooks and rivulets, rival the swamps in their malarial exhalations, and as if this were not sufficient innumerable dams have been constructed in nearly all the almost numberless water-courses, that impede the flow and set back the water, submerging an enormous aggregate of soil area, that is alternately covered and exposed to the action of the solar influence. Finally, the construction of railways, without sanitary supervision, that increase the obstructions to drainage.

Crowning all this is the recklessness of cities and villages in adding the refuse of daily life to this accumulation of decomposition. Commencing with these facts as a basis, and having the vital statistics of a year for a guide, how simple a matter it is to trace the malarial poision in its progressive movements over the State. Going back to the apparent starting point at the Harlem river, we find that the portion of Westchester County in New York bordering on Long Island Sound, and adjoining the State of Connecticut, has long been noted for the presence of malaria, sometimes epidemic, but always an apparent endemic disease, ready to be fanned into an epidemic by favorable conditions. The injudicious obstructions of water-courses by which large areas of soil were saturated with water, the division of farms into prospective building-lots, and their abandonment for agricultural purposes, accompanied by a universal neglect of drainage, added a rank, unwholesome vegetation to the general air of squalor that prevailed. Here was apparently germinated the malarial spores that have been borne by air-currents to the eastward, finding in every swamp the food to nourish and propagate them, drifting along the line of the railway, the continuous passage of trains adding to the impetus; while in every town along the Sound new spots were found to aid in their development. The currents of air that under the influence of topographical depressions ascend the valleys that open iuto the Sound facilitated the work of transportation to the towns in the interior, until the malarial poison has reached nearly to the head-waters of the Housatonic. Intensified by the excess of material, it has invaded places not themselves malarial. The broad central valley of the State, with its atmospheric currents proportionate to its breadth, seems thus far to have proved a barrier to the eastward progress of the subtle agent of disease.

While the influence of the topography on disease is thus clearly manifested, that of geology is not so plain. Nevertheless, that the character of the underlying rocks does have an effect upon the salubrity of certain districts seems to be conceded, although the effects are not so well defined. Where the rocks are near the surface they serve to impede the descent of soil-water, and produce an effect similar in character to its retention in undrained pockets. The whole series of rocks from east to west have been upturned from a once horizontal position, forming so many leaves in the vast book of nature. While possessing, with the exception of the limestone deposits and trap intrusions, the same general characteristics (their mineral constituents for the most part being quartz, feldspar, and mica), are unequally distributed, and where the feldspar predominates there has been an excess of clay deposition resulting from it. Clay, from its power of retaining moisture, is the great producer of malaria all over the world; and to the clay deposits, in connection with vegetable decomposition, we may always look for fever nests

To enumerate the active causes that seem to be at work in producing malaria through the region under consideration, we have:

First, The retention of water in undrained natural deposits.

Second, The natural and artificial obstruction of water-courses.

Third, The increase and reckless disposition of refuse matter.

Fourth, The gradual elevation above tidal influences of marshland along the Sound.

Fifth, The introduction of general supplies of water without adequate systems of sewerage.

All these have aided in the accumulation, through the decomposition of organic matter, of a vast amount of nutriment, without which the morbific agents that produce the class of diseases that come under the general head of fevers could not be propagated and diffused. While the precise nature of these morbific agents has been, is now, and probably for a long time to come will be a subject of doubt and discussion, for the reason that they belong to that realm of matter that the microscope alone reveals to us, and therefore fail to stamp their entity upon our senses, we still can recognize through the aid of our reason and experience those occult characteristics that serve the purposes of identification as clearly and distinctly as if they had been made manifest to our outward sense. We know that there exists a microscopic world that in its extent, variety, and potentiality for evil, defies all human

conception to define its limits. We know that minute organisms fill the atmosphere, are borne upon its ascending and descending currents, and are wafted hither and thither with every zephyr. We know that as we descend the scale of organic life, the power of propagation increases, and that when the highest powers of the microscope are reached, we find organisms whose existence is only made known to us by being magnified a thousand times their natural size, capable of producing as many progeny in a few hours as there are people on the face of the globe. These organisms possess but two functions, those of nutrition by absorption, and propagation by fission. Among these organisms are the germs of disease, and in the exercise of the two and only functions possessed by them lie their destructive power over human life.

Propagated and developed by absorbing the chemical elements that are disengaged in the decomposition of organic matter in swamps and marshes, and among refuse matter anywhere, they are borne on the currents of the air, or conveyed in the water or the clothing. Absorbed in the human system, they create in the finer tissues, the mucus membrane, or the blood corpuscles, an abnormal, vital force that absorbs and feeds upon the nutrition that the human organism prepares for its own use, which, being thus deprived of it, succumbs under the name of disease, so that disease and even death itself is only a new form of life.

The practical question, therefore, is how to prevent the propa tion of these organisms, the answer to which is, to prevent the decomposition in which they are developed. So far as vegetable decomposition is concerned, there are two elements essential to its production—heat and moisture. If one of these is removed the decomposition ceases, and therefore the whole matter may be said to be reduced to the comparatively simple one of drainage, or the removal of the excess of water from its contact with vegetable matter;—and next to this is the proper disposition of refuse material.

It is possible that some of the milder and more prevalent forms of the so called fever diseases may be due to vegetable spores that are developed by absolute growth under circumstances similar to those in which a more potential form of contagion may be nourished and propagated. But in the lower forms of organic life, the transition from the vegetable to the animal is so insensible that it is impossible to draw a line between the two. Nor is it absolutely essential to determine the difference so long as the effects are clearly recognized, and the general cause sufficiently determined to

admit of practical measures of relief. Of course there may be found many individuals who reject every hypothesis that is advanced in regard to the origin and propagation of disease that cannot be demonstrated to the senses, as well as to the reason. "If there is such a thing as a disease germ, let us see it!" they exclaim. To such, the scope of human reason is narrow indeed. It is sufficient to refer them to the results of experience, such as Fairfield and New Milford, where drainage having removed the elements of propagation, the disease has disappeared. A personal examination of New Milford, before the work of drainage was commenced, and while malaria suffused the entire atmosphere of the place, revealed to me the presence of causes more aggravated, if possible, than those I have herein enumerated,—causes which having now been removed, a salubrious condition has been restored.

It is very clear, however, from what has preceded, that the great need throught the State is a comprehensive system, embracing every community, and applicable alike to all. Such a system can only be made practical by a correct knowledge of the topography of the whole state, and the relations existing between all the soil-saturated areas, their relative altitude, and the obstacles, geological or topographical, natural or artificial, that exist in the way of complete and thorough drainage. To this end a topographical survey of the State seems to be essential. Such a survey would necessarily embrace a complete system of sanitation, and would develop physical resources now not sufficiently known, important and valuable enough to amply repay all the cost of the survey. The work done by the General Government in the survey of the coast embraces at least one-third of the State, and would render the expense comparatively light. In fact, it would only be completing the work already accomplished by the General Government.

Lest it be supposed that a proper system of sanitation would interfere with the industries of the State, which derive their motive power from impounded water,—it may not be out of place to add that properly impounded water can never be a source of disease; and there is nothing to prevent the mechanical or domestic use of every drop of water that is derived from the atmosphere, if it is only stored in such a manner that the surrounding soil shall not be saturated, or the deposits in the reservoirs exposed to the action of the sun. These deposits should be periodically removed during a low temperature, and mill-ponds converted into properly constructed reservoirs.

This is asking no more from this class of industry than that gunpowder should be stored in a magazine, and extra hazardous combustibles secured from contact with fire. Finally, I would earnestly impress upon those who have the direction and control of public affairs, and all who have the best interests of the State at heart, the deep significance of the unmistakable warnings that are presented by the present malarial epidemic. The penalties for neglect that vast communities of people have paid in the past, will be exacted always under the operations of the inexorable natural laws of cause and effect, from which no class or condition can claim or expect exemption.

NATURAL HISTORY AND PATHOLOGY

OF THE

TRICHINOUS INFECTION

OF

MAN AND ANIMALS.

BY

NOAH CRESSY, M.D., V.S., PH.D.,

HARTFORD.

NATURAL HISTORY AND PATHOLOGY OF THE TRICHINOUS INFECTION OF MAN AND ANIMALS.

By Noah Cressy, M.D., V.S., PH.D., Hartford.

Amid the various sources for the transmission of disease from the lower orders of animals to man, especially those of a parasitic origin, there is none more dangerous in character nor more loathsome and foreboding than the one caused by the presence of minute worms in the flesh of swine, which we are ever liable to consume. The increasing prevalence of this entozoic contamination of one of our staple products of food has awakened new zeal among the sanitarians both at home and abroad; but until the public mind is more enlightened on the subject, and the real nature and symptoms of this almost intractable malady better understood, we are ever liable to encounter new outbreaks, even under the most favorable circumstances, like the instance that occurred at West Hartford last winter.

In view therefore of the great liability of such a recurrence within the borders of our state, from want of adequate knowledge among our people, we deem it expedient and opportune, on this occasion, to treat the subject in detail, and thus set forth the natural history of the parasite and discuss the morbid changes that occur in the animal body when trichinous pork has been eaten in a raw or partially-cooked state. Such meat is now well known to be exceedingly dangerous as an article of food, and often gives rise to one of the most obscure and fatal maladies that the physician has to contend with in human practice. Hence the necessity for a more general diffusion of knowledge in this direction, that we may actually guard ourselves against this parasitic invasion of disease, and thus more accurately scrutinize the intent of those sensational and exaggerated reports from abroad, which have already unjustly compromised the honor and activity of one of our leading industries.

Discovery of the Trichinæ Spiralis.

This parasite was first described and named by Prof. Richard Owen * of London, in 1835; and though frequently seen by scientific observers it was only regarded as a microscopic curiosity for more than a quarter of a century. His attention had been indirectly called to the subject some two years previously by John Hilton, demonstrator of anatomy at Grey's Hospital Medical College, who had observed a peculiar appearance of human muscle, and thought it depended upon the formation of very small *cysticerci.* He made a communication to the Medico-chirurgical Society in 1833, which was regarded with much favor at the time, and has now become historic in English bibliography, as the first published account† we have of the abode of the worm in question.

Dr. Warmold of the St. Bartholomew school had frequently observed the same abnormal and *specked* condition of certain muscles. The gritty sensation he had perceived and the blunting of the edge of his scalpel, in dissecting, caused him one day to mention the fact to Prof. Owen. This led to some inquiries concerning the nature of these little calcified bodies in the flesh, and the distinguished anatomist at once requested a specimen for microscopic examination, as seen at Fig. 1, from the next subject he should find thus infected. It was not long, however, before his wish was gratified; but ere he had time to investigate the matter, one of the students, now better known as Sir James Paget, the renowned pathologist, dissected some of these calcareous cysts, and with the aid of a microscope, which he borrowed of Dr. Robert Brown, the celebrated botanist, he actually saw this living entozoon first coiled upon itself and in a dormant state.

Figure 1.

A portion of human muscle showing the cysts of the Trichinæ spiralis, natural size.

This discovery enlisted Dr. Brown's attention, and he accordingly rendered his student friend valuable assistance, by "dexterously pulling a worm from the cyst" for examination. Dr. Brown therefore first saw this interesting parasite in a free and larval state, liberated from its prison life.

* Transactions of Zoological Society, Vol. I, page 315.

† See London Medical Gazette, Vol. XI, page 605.

Portions of this trichinized muscle having been "distributed far and wide," much interest was awakened in scientific circles concerning its natural history. The medical profession therefore very naturally turned their attention to Prof. Owen, who of all English naturalists was best prepared to throw a gleam of light on the subject. He found each capsule to contain from one to three small hair-like worms, invariably coiled up in a conical form; hence he gave it the very appropriate zoological name the parasite now bears. But, as this examination was made with a low magnifying power, he did not perceive that this little helminth had any internal organization. Consequently he arragned it among the lowest of the entozoa, in his new-made class Protelmintha.

Subsequent Investigation.

Dr. Arthur Farre* by his careful dissections soon distinguished an alimentary canal, which at once elevated the parasite in the classification of naturalists to the order of nematoid worms. Yet he was unable to decide which was the anterior extremity, and for nearly fifteen years there was no advance of anatomical knowledge on the subject.

It therefore remained for Prof. H. Luschka of Tubingen University, in 1850, to point out more accurately the internal structure. He carefully traced the digestive canal, discovered the sexual organs of the female, and conclusively proved that the mouth was situated in the pointed end of the worm, and not in the blunt extremity, as was generally believed. He described the cyst in its advanced stages, and demonstrated for the first time a complicated system of blood-vessels, and an external membrane of connective tissue by which it is surrounded. In his observations on the vitality of the trichinæ, he found that they survived putrefaction and freezing of the muscles.

Dr. Herbert, a German helminthologist, followed in this line of investigation, and his experiments on dogs actually solved the question concerning the propagation of trichinæ. He was the first to rear encapsuled flesh-worms in the muscular tissue, and claimed that in this state only they were transferable from one animal to another.

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* London Gazette, Dec., 1835.

Dr. Kuchenmeister, having previously shown the transformation of measles or hydatid tæniæ into tape worms, was led to the supposition that the trichina might be a juvenile form of a known nematode; and after a series of observations, he declared that this flesh-worm was the larva of the *Trichocephalus dispar.**

Figure 2.

A portion of ham, showing two cysts of the Trichinæ spiralis enclosed, slightly magnified.

A new impulse was given to trichinal investigation in 1859, by Prof. Virchow's † experiments. He fed a dog upon trichinous meat, and in four days found a large number of these nematodes fully developed and sexually mature in the intestines, but he failed to observe the migration of the new-born worms which Herbst had previously demonstrated. This was owing partially to his having killed the dog too early, and also from the fact that he selected an old animal for the experiment, through whose firm tissues the young trichinæ scarcely ever penetrate.

Prof. R. Leuckart,‡ of Giessen, followed up the researches on the embryology of the parasite ; he made a series of experiments on trichinal infection that were very comprehensive, and did much to advance the science of helminthology. He corrected his own previously-expressed opinion on the validity of Kuchenmeister's observation on the transformation of the flesh-worm into *trichocephalus*, and thus confirmed Virchow. He also showed that the young trichinæ in the intestines became the encysted worm in the muscles, as shown at Figs. 2 and 5, and he believed that they reached there by migration through the tissues, as graphicaly illustrated in Kestner's circular figure, on our fine lithographic plate. Others however claim that the distribution of the trichinæ over the body in so short a time can only be affected through the circulation of the blood.

NATURAL HISTORY OF THE PARASITE.

These famous microscopic entozoa that so frequently contaminate our pork, and are known among naturalists as the *Trichina spiralis*, present in their evolution three well-marked stages of exist-

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* Animal and Vegetable Parasites, Sydenham Ed., 1857, Vol. I, page 321.

† Cyclopedia of Anatomy and Physiology, Vol. II, page 126.

‡ For a summary of his views see Burk's translation in Quar. Jour. of Microscopical Science, Vol. VIII, page 168.

ence for us to study, which really anticipate the larva, pupa, and imago phases of development in the winged insects. The natural history of this flesh worm, therefore, becomes not a little interesting and worthy of special notice in this connection when we endeavor to explain the precise manner of its infection, the phenomena of certain symptoms, and the ultimate cause of death in the human victim.

The encysted worm that Owen described is now well known to helminthologists to represent the *larval* condition of an adult nematode. It detracts nothing however from the honor of his discovery, observes Professor Cobbold, that these little worms have turned out to be the wandering brood of a more highly-organized and dangerous parasite.*

The body of this flesh-worm is very slender and scarcely visible to the naked eye. It tapers anteriorly, and therefore the head is at the pointed end of the worm. The mouth is round, unarmed, and very small. The alimentary canal is straight, and is divisible into three distinct parts, corresponding to the œsophagus, stomach, and intestines.

The male is much smaller than the female, as will be seen in comparing them on the plate, under the same magnifying power. The tail of the male worm is furnished with two lateral appendages, well defined as seen at Fig. 2. The cloaca situated between these points is reversed during the generative act.

The adult female varies from three to four millimeters† in length, with the vulva situated near the end of the anterior fifth of the body, as represented at Fig. 5. There is but a single ovary, and the many ovules are plain to be seen through the smooth integument in various stages of development.

The sexually mature female is one-eighth of an inch in length, while the male is only about two-thirds that size. The female is ovo-viviparous, and thus brings forth its young alive, as seen at Fig. 4 on the plate. The young trichinæ begin at once to migrate from the bowels and perambulate the entire system of voluntary muscles, as portrayed in the circular figure. At last they become encysted, and there remain forever at rest, until they perchance shall have been eaten by some other animal, when they in turn will be set free, and thus complete another zoological cycle.

It should be remembered that it is in the *encysted* state, as seen

* See his classic work on the Entozoa, An Introduction to Helminthology, Lond., 1869, page 335.

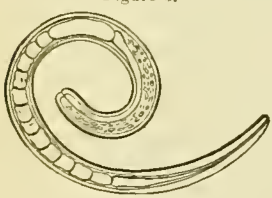
† .09 to .12 of an inch (nine to twelve hundredths of an inch.)

in 2 and 5 ; that the trichina is transported from one flesh-eating animal to another. Pigs are not born with these enzotoa, but get them in some kind of food, probably from the flesh of rats and mice, and when once swallowed by the hog or other animal the gastric juice, in the process of digestion, soon disolves this albumino-cretaceous cyst, when the parasite will be liberated from its prison life, and in a few days become a full-grown worm, within the stomach and intestines, ready to propagate its countless young.

The red voluntary muscles, says Dr. Thudichum, are the "promised land of the trichinæ." There they migrate, grow, aud enshrine themselves. Although the young trichinæ, on the seventh day and later after infection, are found in almost all the organs of the body, yet they do not grow or become encapsuled in any other tissue. The trichinæ, according to his observations, arrive in the muscular tissue with the blood. The diameter of the smallest capillaries in the muscles is much less than the diameter of the young trichinæ, so they are certain to be arrested. They then penetrate the single or double coats of the muscles, and are at once in the interstitial spaces between the muscular fibers. Many trichinæ unquestionably never enter the sarcolemma, and become encysted, but when they do the fibers become permanently destroyed. At the end of the third week after immigration, the inflammatory irritation of the muscular fiber has reached its highest point, the trichina is nearly full grown, and becomes fixed to the spot where it is to be encapsuled. Several of these worms may wander in the same track, and ultimately be enclosed in one lump of exuded matter.

This parasite, which undoubtedly infects a large number of animals, has frequently been found in the rat, mouse, cat, hedgehog, fox, mole, and hog, and is liable to be transmitted from one carnivorous animal to another through the meat. The Commission of the Royal College of Physicians of Vienna report that the main course of the infection in the hog is from the rat, and nearly one-half of all these vermin examined in Moravia were found infected with the encysted trichinæ ; and it is not improbable, as Fleming observes, that the rats were primarily infected and have thus transmitted these parasites from one generatiou to another by virtue of their carnivorous habit at times to devour each other.*

Figure 3.



Trichina magnified one hundred times.

* Veterinary Sanitary Science.

But on the other hand the fact that rats around slaughter-houses are almost invariably infected, while those from distant farms are often found to contain no trichinæ, leads us naturally to inquire whether the rat or the hog was the original host of this destructive parasite.

TRICHINIASIS IN ANIMALS.

The history and symptoms of this disease in the lower animals have not received that attention, in a sanitary point of view, which the importance of the subject demands. That the malady in question has often been mistaken for "Hog cholera," which at a certain stage it so much resembles, no one can doubt. In fact, many of the symptoms of the swine plague are so closely allied to those seen in experimental cases of trichinal infection that it must be exceedingly difficult at times, if not impossible, to draw the line of demarcation, which pathologically separates these two diseases, without a careful microscopic examination. It therefore becomes germane in the consideration of our theme to note some of the more prominent features of this parasitic affection that have been observed in experimental animals.

Professor Gerlach, of the Berlin Veterinary school, found that pigs from three to six months old became much more easily infected than those of a more mature age. In mild cases, the symptoms were not characteristic of much intestinal disturbance. The appetite, though somewhat capricious, was soon regained and the animal resumed its usual habits of life again.

But in more severe cases, where a larger amount of trichinized food had been given, the symptoms were well-marked and of a two-fold character. The loss of appetite, occasional vomiting, and the general depression that ensued, always served to indicate the initial stage of parasitic invasion. A diarrhea soon followed, attended with more or less fever, restlessness, and prostration, but these symptoms were often variable both in time and degree, according to the susceptibility of the animal. In young pigs, the gastro-intestinal irritation not infrequently proved fatal within ten days after feeding them with infected meat.

The second phase of the malady is indicated by rheumatic pains and soreness of the muscles, which appear in the second or third week, when the larval trichinæ commence their migration through the tissues. These symptoms come on gradually, as the others dis-

* See his able paper on the subject in the 7th Public Health Report of the Privy Council, London, 1865.

appear, and thus vary somewhat in character, according to the group of muscles invaded by the parasites.

In this stage, hogs manifest a restless disposition, lying down and getting up again as if to change positions for comfort. They walk with a tottering gait, are stiff and unsteady in all their motions. Hence the reason why they seem to prefer to lie stretched out, as if to rest their weary limbs, from which position such affected animals often require help to rise.

When the muscles of mastication and deglutitiou are invaded, the hog manifests great difficulty in eating and it is often impossible for it to swallow even liquid food. Symptoms of lock-jaw therefore frequently supervene and thus become a serious complication, especially if the throat and the respiratory muscles are also affected. In such cases, the breathing is labored, and there is more or less wheezing. The voice of the animal, Gerlach noticed in several instances to change very materially, and it even became aphonic from the invasion of these parasites. Consequently, such afflicted animals have no power to squeal, even when disturbed.

The tongue and under lip are frequently swollen in some cases, and sometimes the cheeks and the muscles of the neck are also involved, giving a general odematous appearance about the head. The eyes become suffused with tears, and the conjunctiva wears a reddened hue for several days.

With such a group of symptoms present, a shoat must lose condition rapidly and thus become very weak and emaciated in a short time. But the symptoms of experimental cases of trichinization, according to Gerlach, are quite variable, depending largely upon the quantity of infected meat that had been administered at one time. Where the quantity was small, the animal seemed to suffer but little from its effects, and yet after repeated trials he found the entire muscular system as thoroughly invaded with the parasites as where the quantity was large and thus produced severe trichinisis or was followed by a fatal termination.

Hence we are led to infer that hogs may become infected by this noxious flesh-worm without ever showing the slightest symptoms of disease through life; and this was precisely the case at West Hartford. Agaiu, a mild type of this trouble would never be noticed by any farmer in the state, and undoubtedly many cases of trichiniasis have occurred, which were treated for "Hog cholera" or "black tush."

Nearly all mammalia can be artificially infected with trichinæ, but our danger comes wholly from the porcine race. Swine are the bearers of this parasite which affects mankind. Hence, the necessity of more carefully studying the various diseases of the hog, and accordingly exercising greater care in the rearing of these animals, for the market, that our own tables may be protected and our lives prolonged.

HISTORY OF THE DISEASE IN MAN.

Though much had been learned concerning the natural history of this parasite, especially through the investigations of Leuckart and Virchow, yet Dr. Zenker of the Dresden Medical School supplemented these observations in a timely manner and threw new light upon the subject, in a medical point of view. He found, upon microscopic examinations, free and living trichinæ in the muscles of a servant girl who died in the hospital, at the age of twenty, of what was supposed to be a typhoid fever. She was taken ill January 12, 1860, and fell a victim to this strange malady within a month. Her symptoms were severe, and in some respect resembled rheumatism, with painful swellings of the limbs. The history of the case, therefore, was of more than usual interest to the profession, and excited not a little clinical inquiry, but no one mistrusted the cause of the trouble. It was soon ascertained however, after Zenker's post-mortem disclosure, that she had assisted in the making of sausage on the 21st of December previously, and that she had partaken of some of the raw meat only a few days before her illness. This led to his well-known investigation on the nature and pathology of trichiniasis, which has been so extensively published to the world, and has already crowned his life with a diadem of philanthropy, that scientific men will ever revere.

The discovery of this parasitic disease in man, which had undoubtedly existed for ages, aroused at once the zeal of professional experts and veterinarians, and was the dawn of a new era in sanitary science. Here was the key which has now successfully unlocked the mysterious history of many epidemics, that had heretofore baffled the medical wisdom of all nations to explain. With this helminthological revelation, human and comparative pathology joined hands to explore certain realms in the causation of disease, and thus point out the remedy that was destined to relieve the sufferings of millions of human beings that might fall victims to this parasitic malady.

The symptoms of trichinous infection in man will depend largely upon the quantity of diseased meat that has been eaten, and also upon the stage of the malady. The invasion of the disease is marked by local irritation within the intestinal tract, caused by the liberation and development of the encysted trichinæ that the patient has eaten. The millions of new-born worms that immediately follow give rise to nausea, loss of appetite, inflammation of the mucous surface of the bowels, and diarrhœa. Peritonitis may sometimes occur, from the perforation of the intestinal walls, in the escape of the larval parasites.

The second stage is characterized by general symptoms, muscular pains, rheumatism, etc., occasioned by the migration of the worms in the various parts of the body. There is great soreness, œdema, and stiffness of the muscles. Lassitude and profuse sweating not unusually occur in severe cases, and in this respect it resembles typhoid fever, for which it has many times been mistaken. This stage commences in about ten days from the first illness, and lasts four or five weeks.

In the third phase of the malady the trichinæ have become encysted, the fever, soreness, and inflammation begin to abate, and the patient is in a fair way to recover. In many cases there is a complete restoration to health again, but often it leaves the system in a very prostrate condition, according to the amount of muscular lesion that has taken place.

Those suffering from a mild and insidious form of the disease are not unfrequently able to walk about, yet feel tired and exhausted. They may have a good appetite, and the bowels regular. In such cases the pulse is but slightly disturbed, and the patient sleeps soundly, as though nothing was the matter. Lancinating pains soon are felt, especially in the neck and extremities. In fact, they are neither sick nor well, observes Leuckart, and yet they feel strangely and are unable to account for it. Following this transition stage, the pains become more intensified in certain muscles, and with more or less swelling.

Thus a chronic febrile condition sets in, differing from the usual type only in the absence of *acute* symptoms. In other cases a high fever occurs suddenly, with severe bronchial catarrh, and the patient often succumbs to such an attack in a few days, which of course is very terrifying to the friends, and especially so when it shall have been ascertained that the whole cause of the trouble is

this dreaded parasite, consumed with the meat from a fine domestic hog, reared on his premises and fed by his own hands.

MEANS OF PREVENTION.

Although the swine of every land may occasionally be infected with this noxious parasite, still the frequency of its transmission will depend in a great measure upon the habits of the people. In those countries where the practice of eating raw pork and sausages so extensively prevails, of course the parasites contained in the flesh will be transported to the human stomach unmolested, but no fears need be anticipated from even the free use of pork if it has been subjected to a sufficient degree of heat in the process of cooking, to destroy every germ of animal life; then it would be as harmless from this cause as fish, beef, or venison.

The ravages of this loathsome malady from the use of diseased pork are not confined to any country, and I believe it prevails more extensively than is generally supposed. Dr. George Sutton of Aurora, Indiana, who has been examining pork killed in the State, says he has found from three to sixteen per cent. of the hogs affected with this disease—differing in various localities—and that, taking the rate at four per ceut., we have put upon the market from the Western States 221,484 diseased hogs, or about 44,296,800 pounds of infected meat, every ounce of which might produce disease.*

The Committee of the Chicago Academy of Science has shown that the percentage of swine infected by the trichina in the Western States is greater than in Germany, still, the disease is of rare occurrence on this side of the Atlantic compared to the old country; and we can ascribe no cause for the greater prevalence of this disease in Germany, except it be the habit of eating their ham or sausage in the raw or uncooked state.

Thus our only safety from the use of pork, which is always more or less liable to contain trichinæ, from any portion of the country, is through *cooking*. Salting and smoking, unless long continued, have but little effect upon the vitality of these parasites. Raw ham or sausage should never be allowed upon a sanitary bill of fare; and even boiled ham, when large and fashionably prepared, as seen in many of our eating saloons to-day, not unfre-

* A report on Trichinosis, from the Transactions of the Indiana State Medical Society, 1875.

quently may contain these living worms. Hence our lives may be prolonged and our health improved by more attention being given to the domestic duties of the household. Then will all meats be served upon our table in a manner both to nourish and promote our happiness.

As another means of prevention, special attention should also be directed to "village hogs," that are allowed to roam at large and thus become public scaveugers. Iu fact, the known habits of swine to root in their own excrement affords another means for the spread of this contagious malady. If one hog in a pen or drove becomes infected, the rest are almost sure to be in due time; for that the trichinæ may pass away with the discharge from the bowels, and thus be taken up by the others, there can be no doubt.

More attention, also, should be paid to the cleauliness of our public slaughter houses, with a view of controlling the ravages of all infectious and contagious diseases among our domestic animals, which often arise from want of sanitary regulations in their management. Besides, few butchers have the necessary knowledge to guard the people against the possibility of infection in the meats they vend. All public abbatoirs, therefore, should be under the supervision of a competent veterinary surgeon, who should have full control of our meat supplies, and thus be able to prevent an infected article from ever reaching the table even of a single plebian family.

SANITARY INSPECTION.

The actual recognition of this parasite in the flesh of swine during life, observes Leuckart, is of great importance. The symptoms in many of the artificial cases of infection are not characteristic. The appearance of the capsule has been claimed to be diagnostic, but when present its color is not alone sufficient to distinguish it from the surrounding tissues, unless calcified. If the muscle is quite *red*, however, trichinæ are very liable to be present.

Accordingly the microscope is our only means of determiuing their presence beyond a doubt. This investigation is best made during life, by harpooning a piece of muscle for the purpose, and the regions of the neck, shoulders, and fore-limbs seem to have the preference. But in the dead animal, Leuckart has found the diaphragm to contain the largest number of young trichinæ, and the tenderloin, larynx, and tongue are also easily accessible to these wandering parasites.

In severe cases of infection the muscles of the posterior extremities are also found to contain them, but when trichinæ cannot be found in the anterior parts it is useless to look for them in the hind legs. Trichinæ are frequently more abundant at the extremities of the long muscles than in the central portions, consequently these parts should be chosen for examination.

To get the best view of the encapsuled worm, lay bare the fibers by separating them from the surrounding connections. Take up a small portion with the forceps and thus separate in the direction of the fibers, a portion of tissue not more than a millimeter (.03 of an inch) in thickness. Avoid the blood vessels and nerve filaments, and select a sample near the tendon, as the trichinæ are most abundant in that portion. Place the specimen on a glass slide and with mounted needles spread it out to double its width. Moisten the slip with a solution of caustic potash, says Leuckart, and after a few moments, when the muscle becomes clear, lay on a cover of thin glass, flatten out the sample, under pressure, and remove the air-bubbles. By holding the specimen now towards the light, capsules can be seen by the naked eye, as small, clear specks, as shown in our first wood cut.

These parasites vary in appearance, according to their age and degree of development, but their absence cannot be relied upon from the results of a single specimen examined. When the cysts are calcified they can be readily seen by the unaided eye, as little white points in the muscular tissue.

In all such microscopic examinations of infected meat great care should be taken to have the glass-slips and covers free from all foreign substances, specks, etc., which have so often been mistaken and confounded with the object in question.

The claim is made that the southern hogs that roam free through the woods do not have trichinæ, so that if this be true, the lovers of southern bacon can indulge their taste freely. An ounce of hog's muscle has been found to contain 85,000 trichinæ, and forty millions were estimated to be in the body of a man who died of trichinosis. Thus far Germany has been ahead of any other country in the record of cases and endemics.

The following table shows the instances of trichiniasis in the United States.*

* I am indebted to the Report of Dr. W. C. W. Glazier, prepared for the U. S. Marine Hospital service, for many facts and references not otherwise obtainable, and for the table of localities.

TRICHINOSIS IN THE UNITED STATES.

Year.	Locality.	Reporter.	Number of cases.	Number of deaths.	Reference.
1856	Iowa,	Dr. Timm,	1	1	Virch. Arch., Bd. xxix.
1864	New York,	Schnetter,	4	1	Am. Med. Jour., February 20, 1864.
1864	....do,	Professor Dalton,	1	......	Trans. N. Y. Acad. Med., 1864, N. Y. Times.
1864	....do,	Dr. Voss,	4	......	Aitken Prac. Med., vol. i, p. 160.
1864	Cheektowaga, N. Y.,	Dr. Kronbein,	2	2	Buffalo Med. and Surg. Jour., June, 1864.
1864	Marilla, N. Y.,	Dr. Dwyler,	6	2	Am. Jour. Med. Sci., July-September, 1864.
1865	Massachusetts,	A. Sawyer,	......	......	Bost. Med. and Surg. Jour., 1865, p. 16.
1865	N. Y. (in hospital),	Dr. H. Coupland,	1	......	From Path. Soc., Lond., 1874; case diagnosed enteric fever.
1865	Linn County,	Dr. H. Wilson,	6	......	St. Louis Med. Rep., 1866, Chicago Med. Jour., 1866.
1866	Marion, Linn County, Iowa,	Dr. H. Restine,	9	5	N. Y. Med. Rec., August, 1866, Flint's Prac., p. 487.
1867	New York Hospital,	Dr E. C. Seguin,	1	1	N. Y. Med. Jour., vol. iii, 1868, p. 116.
1867	Massachusetts,	......	6	......	Med. Times, April 20, 1867, p. 431, Davaine. Cobbold, p. 169.
1869	Albany, N. Y.,	Dr. Hun,	2	1	Trans. N. Y. State Med. Soc., 1869, p. 157.
1870	Saxonville, Mass.,	......	?	1	Lond. Lancet, 1871, p. 515.
1870	Lowell, Mass.,	......	......	......	Do.
1870	Marengo, De Kalb County, Ill.,	......	8	3	N. Y. Med. Jour., xi, 1870, p. 107.
1874	Aurora, Ind.,	Dr. Sutton,	......	......	A report on trichinosis as observed in Dearborn County, Indiana, in 1874; reprint from Trans Ind. State Med. Soc., 1875.
1874	Detroit, Mich.,	Dr. Keifer,	1	1	
1874	Port Huron, Mich.,	Dr. Northup,	4	1	Mich. Bd. Health Rep., 1875.
1879	Brooklyn, N. Y.,	Dr. William Maddren,	5	2	Proceedings Med Soc., county of Kings, 1879.
1879	Martinville, N. J.,	Dr. E. J. Bergen,	4	1	Letter to Surg. General M. H. S.
1879	Milford, Ind.,	E. P. Gilpin,	5	3	American Practitioner, September, 1879, p. 135.
1880	Newark, N. J.,	......	4	......	N. Y. paper.
(*)	Bridgeport, Conn.,	Prof. L. E. Sanford, Yale College,	......	......	Number of cases a long time ago.
(*)	Newark, N. J.,	Dr. A. Boll,	4	......	Epidemic in German family a long time ago.
(*)	Baltimore,	Prof. Michael,	......	......	Diagnosis not confirmed by post mortem.
(*)	New York,	Specimen shown to Dr. Thayer,	......	......	Microscopist, N. A. Jour. Homœop., No. viii, p. 317, N. Y. Free Press.

* Date uncertain.

BIBLIOGRAPHY OF THE SUBJECT.

Besides the book notices already given with the text, we herewith append a series of standard works for reference.

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Report on Trichinae and Trichinosis, prepared under direction of the Supervising Surgeon-General of the Marine Hospital Service, by C. W. C. Glazier, M.D.

Leuckart, Die Trichinen, Leipzig, 1866.

Transactions American Public Health Association, Ninth Session.

EXPLANATION OF PLATE.

Showing the different stages of development of the Trichina spiralis.

Fig. 1.

This cut gives a bird's-eye view of the migration of the parasite, showing the comparative size of the worm and of the muscular fiber, and the extent that the tissues often become involved. The parasite is shown free, entering the muscular fibres, and fully encapsuled. The striations of the muscular fibres are plainly shown. The illustration is drawn from au actual specimen of human muscle infected by trichinæ. The one selected was the masseter, one of the strong muscles of the jaw. This is from Kestner.

Fig. 2.

Shows an encysted worm in the advanced stage, with signs of fatty degeneration in the muscular fibres at the poles of the capsule. The capsule here has become calcified either wholly or partially, and is distinct from the muscular tissue. From Leuckart.

Fig. 3.

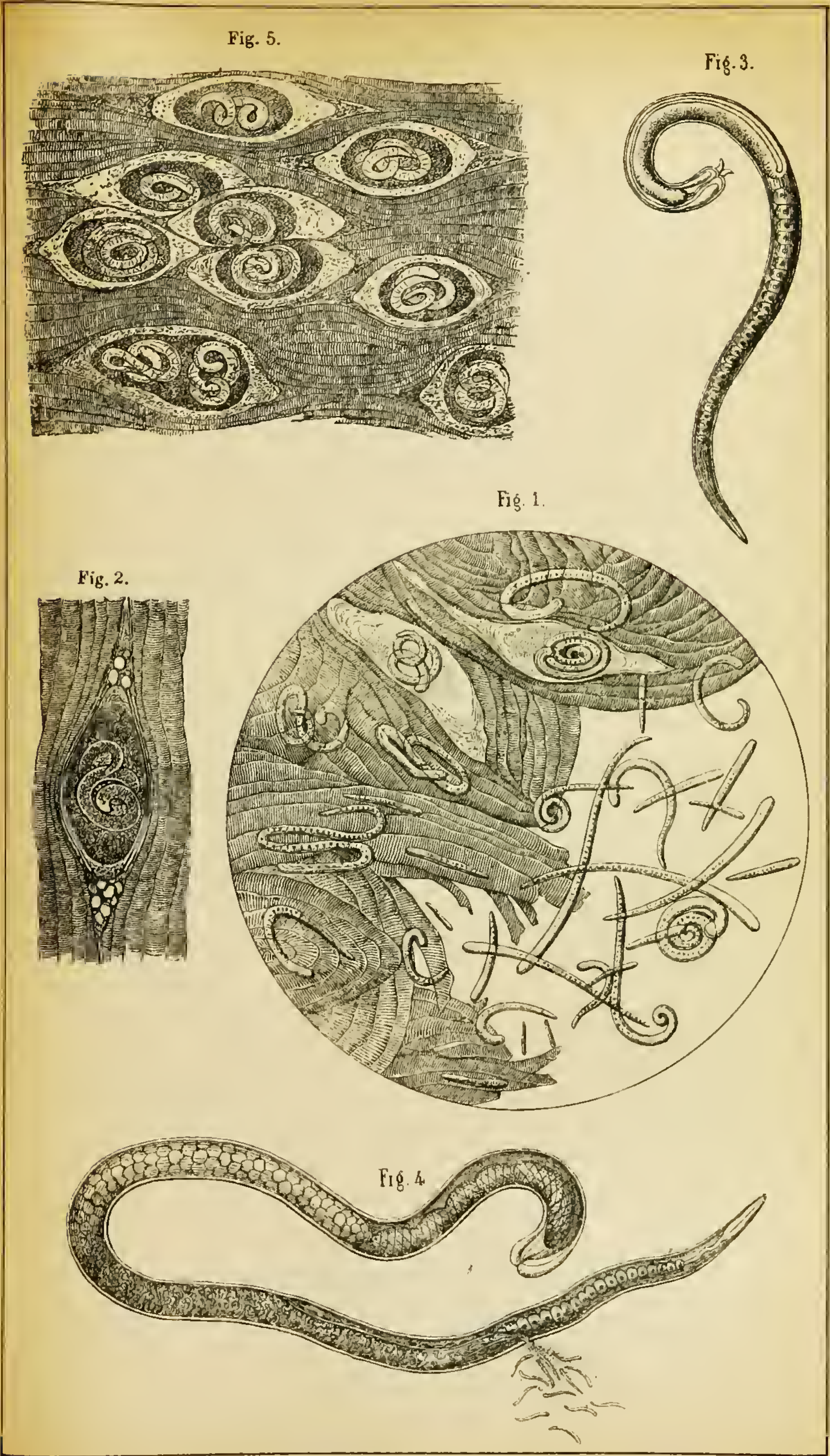
Exhibits a male, highly magnified. This is enlarged 150 diameters, and represents the parasite fully grown, from Kestner.

Fig. 4.

An adult female, showing its relative size compared with the male, the contained ovae, and the discharge of the living worm from the cloaca, situated near the anterior part of the parasite. The embryos are seen through the walls, and the trichinæ at birth, magnified 150 diameters, from Kestner's plate.

Fig. 5.

Encapsuled worms, showing the walls of the cyst, the parasite coiled upon itself, and the great engorgement of a muscle. This shows how thickly the parasites may be encapsuled. The frequency varies very much in different muscles. From Leuckart.



TRICHINÆ SPIRALIS,
~~after Kestner~~ and Leuckart.

SANITARY LAWS.

TITLE XVI, CHAPTER II.

Coroner's Inquests.

SEC. 1. When any person shall come to a sudden or unnatural death, or be found dead, the manner of whose death is not known, any justice of the peace shall, by warrant, forthwith cause a jury of twelve judicious men to be summoned, who shall be sworn by such officer to inquire of the cause and manner of such death, and shall present on oath a true verdict thereof, under their hands, to some justice of the peace, who shall return it to the next Superior Court in the county; and no fees shall be allowed for any of said services.

SEC. 2. Any officer who shall unnecessarily neglect or fail to execute such warrant, or any person summoned as a juror who shall fail to appear and serve without reasonable excuse therefor, shall forfeit five dollars to the town; and the officer serving said warrant shall remain in attendance upon said justice and jury, so long as he shall be required so to do.

SEC. 3. The attendance of witnesses may be enforced by *subpœna* and *capias* issued by the justice of the peace holding any such inquest, and their testimony taken in the same manner as on the trial of a criminal prosecution before a justice of the peace.

SEC. 4. In New Haven, and any other town which shall vote so to regulate inquests therein, a jury of six men only shall be summoned, and the proceedings shall otherwise be as provided in the preceding sections, except that fees shall be paid as provided in Chapter XXIII of Title XIII.

TITLE XVI, CHAPTER XI.

Public Health and Safety.

SEC. I. The justices of the peace and selectmen in each town shall constitute a board of health, and have all the power necessary and proper for preserving the public health and preventing the

spread of malignant diseases therein, and may appoint its president and such health officers or health committees as it may deem expedient, and delegate to them any of its powers, and the members present at any meeting convened as the board shall direct, shall be a quorum for business; and may appoint a clerk, who shall be sworn and shall record the acts of such board.

Sec. 2. Such board, or such health officers, or health committees shall examine into all nuisances and sources of filth injurious to the public health, and cause to be removed all filth found within the town, which in their judgment shall endanger the health of the inhabitants; and all expenses for such removal shall be paid by the person who placed it there, if known, and if not known, by the town; and when any such filth or nuisances shall be found on private property, such board shall notify the owner or occupant of such property to remove the same at his expense, within such time as the board shall direct; and if he shall neglect to remove it, he shall be fined not less than twenty dollars nor exceeding one hundred dollars, and pay such expense and costs as the town shall incur by such removal; and after the expiration of such time, such board shall cause such filth or nuisance forthwith to be removed or abated; and such board, or such health officer or committee as it shall direct, may enter all places where such board shall have just cause to suspect any such nuisances or causes of filth to exist.

Sec. 3. It shall be sufficient notice to all persons of any regulation of such board, if it be published in a newspaper published in the town, or posted for three days on each sign-post in said town; and if any person shall willfully violate such rules, after they have been so published or posted, or after actual notice thereof shall have been given to him, he shall forfeit not less than fifteen dollars, nor exceeding one hundred dollars.

Sec. 4. The board of health, in any town contiguous to navigable waters, may assign within the town, or the waters contiguous thereto, the port or place in any harbor, road, river or bay, where vessels coming into the limits of such town or into such contiguous waters shall, if need be, perform quarantine; and every vessel which shall, between the first day of June and the first day of November, come from any foreign port or place, or from any port or place in the United States south of the capes of the Delaware, and come to anchor in any such harbor, road, bay, river or contiguous waters, if any place for quarantine shall have been assigned

as aforesaid, shall come to anchor and lie at such place so assigned, and at no other place, until discharged in manner as is hereinafter provided; and the master of every vessel coming to anchor as aforesaid shall forthwith make signal for a health officer by hoisting colors in the shrouds, or, if need be, may send a person on shore, who shall notify the health officer of the port, or if there be no health officer, a member of the board of health, of the arrival of such vessel, and forthwith return on board; but the provisions of this section shall not apply to any such vessel which shall have entered any port or place in the United States north of said capes, where there are quarantine regulations, and been visited by a health officer, received a clean bill of health, and been permitted to go to the wharves and unload thereat; and such clean bill of health, or a certified copy thereof, shall be left with the collector of the port within twenty-four hours after the arrival of such vessel.

Sec. 5. When the board of health in any town shall deem it expedient that vessels arriving in its town or in the waters contiguous thereto, from any port or place in the United States, north of the capes of the Delaware, should perform quarantine, such board may by an order, published or posted as aforesaid, subject such vessels to quarantine in the same manner as if they arrived from a foreign port or place.

Sec. 6. Any vessel subject to quarantine, arriving in the harbor of New Haven, on board of which there shall be no sickness at the time of such arrival, or on board of which, during the passage, there shall have been no case of malignant or contagious disease, may come to and make fast at the end of any public wharf in said harbor, without incurring any penalty for violation of the quarantine laws; but no person shall be allowed to leave said vessel, except to make fast to the wharf, until said vessel shall have been visited by a health officer, and by him discharged from quarantine; and if the health officer, on visiting any such vessel, shall find any such sickness on board as, in his opinion, shall make it proper for him to cause such vessel to continue subject to quarantine, he shall order it to be removed to such place as shall be assigned as a place of quarantine.

Sec. 7. On notice given to a health officer or member of the board of health of the arrival of any vessel as aforesaid, he shall visit it without delay, and may, on examination, give a certificate of health, discharging it from quarantine, or cause it to

continue subject to quarantine; and every vessel so subjected to quarantine shall perform quarantine under the regulations of such board of health.

Sec. 8. The board of health may establish the fees, not exceeding five dollars, which the health officer shall be entitled to receive for visiting a vessel as aforesaid, and the master or owner of such vessel shall pay the same to such health officer.

Sec. 9. No master of any vessel, liable to perform quarantine as aforesaid, shall fraudulently attempt to elude a quarantine by false declarations of the port or place from whence he came, or land or suffer to be landed from his vessel any person or thing except in the manner herein before provided, nor admit any person to board such vessel, before it shall have been visited as aforesaid.

Sec. 10. When a health officer or member of the board of health shall, on visiting any vessel as aforesaid, think it necessary that it should be cleansed or purified, he shall direct its master to hoist a white flag on the head of the mainmast, there to be kept during the day time; and shall apply without delay to the board of health to direct the time and manner in which the cargo on board such vessel shall be, in part or in whole, cleansed or purified; and such vessel, or such part thereof as may be infected, shall be cleansed in such method as such board shall direct. And when such vessel shall contain any person ill of a contagious or infectious disease, he shall be removed on shore to such place as said board may direct, and nursed and provided for, in the manner prescribed by law. And such board may also cause any passenger on board, and such of the mariners as the master shall not require to continue on board, to be removed on shore and secluded for fourteen days, in such place as the board shall direct; and if any person shall, without such permission, visit any person so confined, he shall be deemed to be contaminated with infection, and be liable to the same confinement and penalty as are imposed upon the person visited.

Sec. 11. If the board of health shall find that any certificate of health granted by them was obtained by fraud or false representation, or be of opinion that any vessel, person, or cargo, should perform further quarantine for the purpose of being cleansed or purified, on notice thereof being given by the board to such person, or the owner, master, supercargo or consignee, of such vessel or cargo, as the case may be, the same shall in all respects be liable

to be proceeded with in the same manner as if no certificate of health had been given.

SEC. 12. The board of health of any town may interdict communication between it and any other town or place in which any contagious or malignant disease is prevalent.

SEC. 13. Every taverner or lodging-house keeper, in whose house any lodger becomes sick of any malignant or contagious disease, between the first day of May and the first day of November, shall within twelve hours after such lodger becomes sick, report in writing to the board of health or health officer, the name of such person if known, and the nature of his disorder.

SEC. 14. When any person shall refuse to obey any legal order given by a board of health, or shall endeavor to prevent it from being carried into effect, any justice of the peace, on the request of such board, may issue his warrant to any proper officer, or, if need be, to any indifferent person, therein stating such order, and requiring him to carry it into effect, and such officer or indifferent person shall execute the same.

SEC. 15. All fines imposed for the violation of any provision of this Chapter relating to public health, or regulation of any board of health, shall be paid to the town in which the offence is committed, and constitute a fund in such town, subject only to the order of such board, to be by it applied to its contingent expenses, and to the relief of such poor persons in the town as may be ill with malignant or infectious disease, or to the prevention of such disease.

SEC. 16. The board of health in any town may order any person, whom they may have reasonable ground to believe to be infected with any malignant, infectious, or contagious disease, into confinement in any place to be designated by said board, there to remain so long as said board shall judge necessary.

SEC. 17. Boards of health may adopt such measures for the general vaccination of the inhabitants of their respective towns as they shall deem proper and necessary to prevent the introduction or arrest the progress of small-pox, and the expenses in whole or in part of such general vaccination shall upon their order be paid out of the town treasury.

SEC. 18. Every person who shall refuse to be vaccinated, or prevent any person under his care and control from being vaccinated, on application being made by any member of the board of health, or by a physician employed by the board of health for that

purpose, unless, in the opinion of another physician, it would not be prudent on account of sickness, shall forfeit five dollars to the town where the offence shall be committed.

Sec. 19. Every person who shall violate any provision of the preceding sections of this chapter, for which no other penalty is provided or provision made, shall be fined not exceeding five hundred dollars or imprisoned not exceeding six months or both.

Sec. 24. Cities, boroughs, and towns may, at any legal meeting duly warned for the purpose, appoint inspectors of illuminating oils and burning fluids, and make by-laws regulating the inspection of the same within their respective limits; and the inspectors so appointed shall make complaint to the proper authority for all infringements of the law regulating the mixture or sale of naphtha and illuminating oils.

Sec. 25. In all cities the court of common council, in all boroughs the warden and burgesses, and in all towns and parts of towns not within the limits of any city or borough, the selectmen, shall require that all public halls for lectures, exhibitions, or amusements shall have ample facilities for entrance and exit, and be arranged so as to promote the comfort and safety of persons visiting them, and be closed till such requisitions are complied with; and any city, borough, or town may make suitable by-laws regarding the same.

Sec. 26. Every person who shall let or use any hall for such purpose, after it shall have been ordered to be so closed, shall forfeit one hundred dollars to the city, borough, or town by the authorities of which such order was made.

Sec. 27. Any person aggrieved by any order closing such hall may appeal therefrom to a judge of the Superior Court, who shall, on notice, inquire into the facts by a committee or otherwise, and may make such order in the premises as to him may seem proper, and tax costs in favor of the prevailing party and issue execution therefor.

Sec. 28. The court of common council of each city shall have power to make ordinances to prevent the erection of unsafe buildings therein; to provide for the examination of all plans and specifications of proposed buildings; to provide for the inspection of all buildings in process of erection; to make general rules regarding the materials to be used in building, and the strength and manner of using the same; to prohibit the erection of any building not in conformity with such rules, and the plans and specifications of

which shall not have been examined and approved in accordance with such ordinances; and to provide for the appointment of an inspector of buildings.

Sec. 29. The selectmen of any town may, and on the written application of any of its inhabitants shall, examine any building or proposed building therein with reference to its safety, after reasonable notice to the owner or builder and occupant, and may make such written order relative to its construction, maintenance, protection, repairs, or removal as they may deem proper; a true and attested copy of which shall be left by some proper officer with or at the usual place of abode of such occupant, and such owner or builder if resident in this State.

Sec. 30. Such owner, builder, or occupant may appeal from such order to the Superior Court of the county in which said building is, or to any judge of said court in vacation, by a petition, to which shall be annexed a citation to the town, which shall be served within three days after the service of such order, and be returnable within three days after the service of such petition; and upon such petition such court or judge shall appoint three disinterested freeholders to view the premises and report to such court or judge such an order as they may deem expedient in reference thereto, which, being accepted, shall become effectual between the parties to the appeal; and said court or judge may award costs at discretion.

Sec. 31. If any final order shall not be executed within ten days after its service by copy, or, if made on appeal, after its acceptance by such court or judge, the selectmen shall execute it, and the person who failed to comply with it shall pay to the town the expense of its execution and forfeit not more than one thousand dollars, half to said town and half to any informer.

CHAPTER LXIX. 1878.

An Act in addition to Chapter II, Title XVI of the General Statutes, being an Act in Relation to Public Health and Safety.

Section 1. In all cities the court of common council, in all boroughs the warden and burgesses, and in all towns and parts of towns not within the limits of any city or borough, the selectmen, shall require that all churches, school-houses, and all public halls that are used for lectures, amusements, or assemblages of people shall be provided with ample facilities for safe and speedy exit in case of necessity. And such court of common council, warden and

burgesses, or selectmen may cause such churches, school-houses, and public halls so to be closed until such requirements are complied with. March 27, 1878.

CHAPTER LXXII. 1881.

An Act concerning Fire-escapes.

SECTION 1. Every story above the second story, not including the basement, in any workshop or manufactory, on which floor more than ten operatives are employed, shall be provided, within six months from the passage of this act, with more than one way of egress, by stairways on the inside or fire-escapes on the outside of the building, and such stairways and fire-escapes shall be kept free from obstruction, and shall be accessible from each room in said story.

SEC. 2. It shall be the duty of the selectmen of the town, or of the fire-marshal of any city in which such building is situated, to examine all buildings referred to in the first section of this act, and if on examination they find that such building is provided with fire-escapes equivalent to two sufficient stairways, and furnish the owner thereof with a certificate to that effect, said owner shall not be liable under this act.

SEC. 3. Every owner of such building who shall violate the provisions of this act shall on conviction be fined fifty dollars. 1881.

CHAPTER IV.

Pollution of Water Supplies.

SEC. 18. Every person who shall put anything into any waters from which ice is procured for consumption, with intent to injure the quality of said ice, or who shall put and leave any dead animal or carcass in any pond, spring, or reservoir, the water of which is conveyed to any building, shall be fined not more than seven dollars or imprisoned not more than thirty days, or both.

CHAPTER LXVIII.

SEC. 2. Every person who shall put anything into any well, spring, fountain, or cistern or other place from which water is procured for drinking or other purposes, with the intent to injure the quality of said water, shall be fined not less than seven dollars nor more than five hundred dollars, or be imprisoned not more than six months. June 28, 1876.

CHAPTER LXXXIII.

An Act for the protection of Water from which Ice is procured.

That every person who shall willfully and maliciously put anything into any waters from which ice is procured for consumption, with intent to injure the quality of such ice, or who shall willfully and maliciously throw any stone or other materials into the waters or upon the ice with intent to injure the quality of the ice or the cutting and gathering the same, or who shall willfully or maliciously put or leave any dead animal or any carcass in any pond or reservoir the water of which is conveyed to any building, shall be fined not more than thirty dollars or imprisoned not more than thirty days. 1878.

CHAPTER XIV. 1879.

An Act relating to Nuisances.

That every person who shall willfully put into any of the waters of this State any dead land animal shall be fined not less than seven dollars nor more than fifty dollars. 1879.

CHAPTER, CXXI.

An Act relating to Oleomargarine.

Section 1. That no person shall offer for sale or have in his possession for sale an article known to commerce as Oleomargarine, being a substance manufactured from suet or tallow and resembling butter, without having the word "Oleomargarine" plainly stamped or written on the cover or enclosure.

Sec. 2. That all persons guilty of violating the preceding section shall be fined the sum of fifty dollars for each offence, one-half to him who shall prosecute and one-half to the town where the offence shall be committed. 1878.

CHAPTER IX.

Sec. 2. Any person who shall willfully sell or offer to sell the flesh of any animal or fowl, which died or was killed when diseased, shall be fined not more than one hundred dollars or imprisoned not more than six months.

CHAPTER XII. 1880.

Any person who shall knowingly sell or expose for sale milk or any product of milk from any cow which shall have been adjudged by the commissioners upon diseases of domestic animals affected

with tuberculosis or other blood disease, shall be fined not more than seven dollars or imprisoned not more than thirty days, or both.

CHAPTER IX.

Adulteration of Liquor.

SEC. 47. Every person who shall manufacture, sell, or keep for sale any intoxicating liquor, or any made or compounded in imitation thereof, which is adulterated with any deleterious or poisonous ingredients, shall be fined not more than five hundred dollars or imprisoned not more than one year, or both.

CHAPTER LXXXIV. 1880.

SECTION 1. No person shall adulterate any sugar or molasses within this State.

SEC. 2. No person shall knowingly, willfully, or maliciously sell, or offer, or expose for sale within this state any sugar or molasses which has been adulterated with salts of tin, terra alba, glucose, dextrose, starch, sugar-corn syrup, or other preparations from starch.

SEC. 3. Any person guilty of violating any of the provisions of this act may be punished by a fine not exceeding five hundred dollars or by imprisonment not more than one year.

CHAPTER IX.

Explosives.

SEC. 56. Every person who shall mix for sale naphtha and illuminating oils, or shall keep for sale any fluids for illuminating purposes, inflammable at a less temperature than (110° F.) one hundred aud ten degrees Fahrenheit, shall be fined not more than five hundred dollars and imprisoned not more than three years.

CHAPTER LXVI. 1880.

SECTION 1. Every person who shall negligently or maliciously place any poison or poisoned food in any public place, or on premises not exclusively occupied by him, shall be fined not more than fifty dollars or imprisoned not more than three months, or both.

SEC. 2. Section nineteen, chapter four, title twenty of the general statutes is hereby repealed.

CHAPTER VI.

Section 11, General Statutes.

Whoever shall employ in the manufacture of paper any person who shall not have had the small-pox, or been vaccinated, shall pay to any town all expenses caused it by the sickness of such person with small-pox contracted while so employed.

CHAPTER CVIII.

An Act to prevent the Adulteration of Food and other Articles, and to preserve the Public Health.

SECTION 1. The boards of health of the several cities, boroughs, and towns, in this state, may from time to time at their discretion, procure from any dealer in provisions, groceries, medicines, or other articles of consumption, samples of such articles, and cause the same to be analyzed by one of the state chemists, and if on such analyzation it shall be found that the article analyzed is adulterated with any deleterious or foreign ingredient or ingredients, other than is represented verbally and in a conspicuous label by the seller, the chemist making the analysis shall issue his certificate setting forth the kind and quantity, as near as may be, of deleterious and foreign ingredients found in the article analyzed, and the board of health causing such analysis to be made shall cause said certificate to be published in some paper published in the city, borough, or town, or one nearest thereto, where the article analyzed was obtained, for such length of time as they may think proper, and the cost of analysis, together with the cost of the publication of the certificate, shall be paid by the person or firm from whom the article analyzed was obtained; and if such person or firm shall so elect, he or they may annex to said certificate his or their sworn affidavit setting forth from whom the article analyzed was purchased by him or them.

SEC. 2. In all cases where an analysis has been made according to the provisions of section one, of this act, and the article or articles analyzed shall have been found pure and free from foreign ingredients, the cost of the analysis shall be paid by the city, borough, or town, whose board of health, or any officer thereof, caused such analysis to be made.

Approved, March 28, 1870.

CHAPTER CVII.

An Act to prevent Irregular Medical Practice.

SECTION 1. Any itinerant person, not an inhabitant of this state, who shall by circular, handbill, or any other mode of advertisement, profess to treat, and shall in any town in this state treat disease or injury by any drug, nostrum, manipulation, or other expedient, shall be fined twenty-five dollars for each day that he shall exercise his profession without procuring a license therefor.

SEC. 2. Selectmen in towns, and the chief officer of police in cities, may issue such licenses upon payment to the town or city treasurer by such itinerant person of the sum of twenty dollars, for each day for which his license may be granted. The license shall distinctly state the number of days for which it shall be in force, and may be renewed at its expiration for any further time, upon the same terms. Such selectmen and chief officer of police shall record such licenses in books kept by them for that purpose, which shall be open to public inspection.

SEC. 3. This act shall not apply to commissioned surgeons in the army or navy of the United States, to any persons rendering gratuitous services in cases of emergency, nor to any physician or surgeon coming into this state from another state, to consult in any particular case.

SEC. 4. Prosecutions for violations of this act may be heard and determined by police courts, where established, and by justices of the peace in towns in which such courts have no criminal jurisdiction.

Approved, April 12, 1881.

CHAPTER CXXII.

An Act relating to Medicines and Poisons.

SECTION 1. The governor shall, on or before the first day of June, 1881, appoint three persons to be commissioners of pharmacy, one to hold office for one year, one for two years, and one for three years; and he shall annually thereafter, on or before the first day of June, appoint one such commissioner, who shall hold office for three years from that date; and any vacancy that may occur may be filled by the governor for the unexpired term. Said appointment shall be so arranged that one of said commissioners shall be a reputable physician, and two of them shall be pharmacists, selected by the governor from six persons to be

annually nominated to him by the Connecticut pharmaceutical association; and said commissioners shall keep a record of their proceedings, and may give certified copies thereof, which shall be legal evidence.

SEC. 2. No person shall conduct or keep a shop, store, or place of any kind, for retailing drugs, medicines, poisons, or such chemicals as are used in compounding medicines, or compound or dispense prescriptions of a physician, or vend medicines or poisons, unless he shall have been licensed therefor, as hereinafter provided, or shall be under the supervision of a licensed pharmacist.

SEC. 3. The comptroller shall designate a room in the capitol for the meetings of said commissioners, which shall be held each year, on the first Tuesdays of March, June, September, and December, and at such other times and places as they may deem necessary, to determine the qualifications of applicants for license as pharmacists, and said commissioners shall license, by a certificate signed by them, or by a majority of them, such persons as shall produce satisfactory evidence to them of their qualifications and attainments, either by diploma, granted to the applicant by some reputable college of pharmacy, or by the certificate of some reputable pharmacist that the applicant has, for not less than three years prior to his application, received instruction in pharmacy, and possesses the necessary qualifications of a pharmacist, or by other satisfactory evidence. Licenses shall specify the name of the person licensed, the date when granted, the city or borough in which he shall conduct his business, and, if in a city, the street and number of his place of business; and his license shall be conspicuously exhibited in his place of business, and shall remain in force until the first day of April next after said date, unless granted at a meeting of said commissioners on the first Tuesday of March, in which case such license shall terminate on the thirty-first day of March of the succeeding year, or unless such person shall remove his place of business without notice to the commissioners; and a license may be renewed upon the application of the person licensed, upon the terms hereinafter provided.

SEC. 4. Every person conducting the business of pharmacy shall, within ninety days after the first day of June, 1881, and on or before the first Tuesday of March annually thereafter, if then conducting said business, apply to said commissioners for said license, or for a renewal thereof, and establish his right therefor

by such evidence as shall be satisfactory to them; and they shall adopt forms of application for license, and rules and regulations, prescribing the manner in which the evidence in support of such application shall be presented to them; and they shall furnish such forms, and such rules aud regulations, to any person upon his request.

SEC. 5. Each applicant shall pay to said commissioners three dollars for his license, and two dollars for each renewal thereof; and said commissioners shall account semi-annually on the first Mondays of January and July, with the treasurer of the state, for the sums received by them for licenses, and shall be paid by the state at the time of such accounting the money necessarily expended by them for stationery and printing, and five dollars a day each, for each day of service, not exceeding twenty days in any one year, and mileage at the same rate as is paid to members of the general assembly: *provided*, that if the amounts received by said commissioners for said licenses shall not be sufficient to pay them said sums for services and mileage in full, such amounts shall be apportioned pro rata among said commissioners: and their charges for expenses for stationery and printing, and for services and mileage, shall be audited and approved by the comptroller in the proportion aforesaid, who shall draw his order upon the treasurer therefor.

SEC. 6. Nothing hereinbefore contained shall be construed to prevent a practising physician from compounding his own prescriptions, or to prevent the sale of proprietary medicines, or of any drugs, medicines, or poisons at wholesale to licensed pharmacists, or for use in manufactures of the arts, or to prevent any person from becoming a partner in, or the proprietor of, a pharmacy conducted by a licensed pharmacist, or any keeper of a country store from keeping for sale and selling such domestic remedies as are usually kept and sold in such stores, but such keeper shall not compound medicines, and medicinal preparations so kept and recognized by the United States Dispensatory shall be compounded by a licensed pharmacist and marked by his label.

SEC. 7. Any person who shall willfully violate any of the provisions of the preceding sections shall forfeit five dollars for each day that he shall continue such violation, one-half to him who shall prosecute to effect, and the other half to the town in which the offense if committed.

Sec. 8. The provisions of the preceding sections of this act shall apply only to the cities and boroughs of the state.

Sec. 9. Every person who shall knowingly adulterate or cause any foreign or inert substance to be mixed with any drug, or medicinal substance or preparation recognized by any pharmacopœia, or employed in medicinal or medical practice, so as to weaken or destroy its medicinal effect, or shall sell such drug, compound, or preparation, knowing it to be so adulterated or mixed, shall be fined not less than ten dollars nor more than one hundred dollars, and upon conviction all such adulterated or mixed articles in his possession may be seized upon a warrant issued by the court in which such conviction is had, and destroyed by the officer by whom such seizure shall be made.

Sec. 10. Every person who shall sell arsenic, strychnine, or prussic acid shall affix to the package sold by him a label, plainly marked with his name, date of sale, and the word "poison," and shall enter in a book kept by him for that purpose the name of the purchaser, the date of sale and the quantity sold; which book shall be kept open for public inspection, carefully preserved, and when he shall close his business, or remove from the town in which such business is carried on, or when said book shall be filled with such entries, it shall be deposited by him in the office of the town clerk of the town in which he may conduct his business; and any person who shall violate the preceding provisions of this section, or who, when purchasing the articles herein named, shall give a false or fictitious name to the vendor thereof, shall be fined not less than ten dollars, nor more than one huudred dollars.

Sec. 11. Police courts, and city courts having criminal jurisdiction, where established, and justices of the peace in towns where such courts do not exist, shall hear and determine prosecutions for violations of the provisions of this act.

Sec. 12. This act, except so much thereof as provides for the appointment of said commissioners of pharmacy, shall take effect on the first Tuesday of June, 1881.

Approved, April 14, 1881.

AN ACT ESTABLISHING A STATE BOARD OF HEALTH.

Section 1. That the governor, by and with the advice and consent of the senate, shall appoint six persons, three of whom shall always be physicians, and one lawyer, who, together with a secre-

tary to be elected by them, shall constitute the State Board of Health. Of the six persons first appointed, two shall serve for two years, two for four years, and two for six years, from the first day of July next following their confirmation, and the governor shall hereafter biennially appoint, by and with the advice and consent of the senate, two members of said State Board of Health, to hold their offices for six years from the first day of July next following their confirmation. If a vacancy occur in said board during a recess of the legislature it shall be filled by the governor until the next regular session of the same.

Sec. 2. That the State Board of Health shall meet at least once in every three months, and as much oftener as they may deem proper. Four members shall always constitute a quorum for business. No member of the board shall receive any compensation except the secretary, but the actual traveling and other expenses of the members while engaged in the duties of the board shall be allowed and paid out of the appropriation made for its support. They shall select annually one member of the board as president, and shall appoint a suitable person, who shall be a physician, to be their permanent secretary and executive officer, who shall hold his office so long as he shall faithfully discharge the duties thereof, but who may be removed for cause at any meeting of the board, a majority of the members voting therefor. If a member of the board be elected as secretary, the vacancy thus caused shall be filled by the governor, as provided in section first.

Sec. 3. That the secretary shall keep a record of the acts and proceedings of the board, perform and superintend the work prescribed in this act, and such other duties as the board may order under their general direction. and shall receive an annual salary of one thousand dollars, which shall be paid him in the same manner as the salaries of other State officers are paid, and such necessary expenses as the comptroller of the treasury shall audit, on the presentation of an itemized account, with vouchers annexed and the certificate of the board, shall be allowed him.

Sec. 4. That the said State Board of Health shall take cognizance of the interests of health and life among the people of this State; they shall make sanitary investigations and inquiries respecting the causes of disease, and especially of epidemics, the sources of mortality, and the effects of localities, employments, conditions, *ingesta*, habits, and other circumstances upon the public health; and they shall collect such information in respect of these

matters as may be useful in the discharge of their duties, and contribute to the promotion of health and the security of life in this State; they shall cause to be made by their secretary, or by a committee of the board, inspections at such times as they may deem best, and whenever directed by the governor or the legislature, of all public hospitals, prisons, asylums, or other public institutions, in regard to the location, drainage, water supply, disposal of *excreta*, heating and ventilation, and other circumstances in any way affecting the health of their inmates, and shall also suggest such remedies as they may consider suitable for the removal of all conditions detrimental to health in the said institutions, in writing, to the officers thereof.

Sec. 5. That the said board shall cause all proper sanitary information in its possession to be promptly forwarded to the local health authorities of any city, village, town, or county in this State, which may request the same, adding thereto such useful suggestions as the experience of said board may supply. And it is also hereby made the duty of said local health authorities to supply the like information and suggestions to said State Board of Health, together with a copy of all their reports and other publications. And said board of health is authorized to require reports and information (at such times and of such facts, and generally of such nature and extent, relating to the safety of life and promotion of health, as its by-laws or rules may provide) from all public dispensaries, hospitals, asylums, infirmaries, prisons, and schools, and from the managers, principals, and officers thereof; and from all other public institutions, their officers and managers, and from the proprietors, managers, lessees, and occupants of all places of public resort in the State; but such reports and information shall only be required concerning matters or particulars in respect of which it may in its opinion need information for the proper discharge of its duties. Said board shall, when requested by public authorities, or when they deem it best, advise officers of the State, county, or local government in regard to sanitary drainage, and the location, drainage, ventilation, and sanitary provisions of any public institution, building, or public place.

Sec. 6. That it shall be the duty of the state board to give all information that may be reasonably requested, concerning any threatened danger to the public health, to the local health officers, and all other sanitary authorities in the State, who shall give the like information to said board; and said board and said officers and

said sanitary authorities shall, so far as legal and practicable, co-operate together to prevent the spread of disease, and for the protection of life and the promotiou of health, within the sphere of their respective duties.

SEC. 7. That said board may, from time to time, engage suitable persons to render sanitary service and to make or supervise practical and scientific investigations and examinations requiring expert skill, and to prepare plans and reports relative thereto. And it is hereby made the duty of all boards and agents, having the control, charge, or custody of any public structure, work, ground, or erection, or any plan, description, outlines, drawings, or charts thereof, or relating thereto, made, kept, or controlled under any public authority, to permit and facilitate the examination and inspection, and the making of copies of the same by any officer or person by said board authorized; and the members of said board, and such other officer or person as may at any time be by said board authorized, may, without fee or hindrance, enter, examine, and survey all such grounds, erections, vehicles, structures, apartments, buildings, and places.

SEC. 8. That it shall be the duty of the State Board of Health to have the general supervision of the State system of registration of births, marriages, and deaths. Said board shall prepare the necessary methods and forms for obtaining and preserving such records, and to insure the faithful registration of the same in the several counties, and in the central bureau of vital statistics at the capital of the State. The said board of health shall recommend such forms and amendments of law as shall be deemed to be necessary for the thorough organization and efficiency of the registration of vital statistics throughout the State. The secretary of said board of health shall be the superintendent of registration of vital statistics. As supervised by the said board, the clerical duties and safe keeping of the bureau of vital statistics thus created shall be provided for by the Comptroller of the State, who shall also provide and furnish such apartments and stationery as said board shall require in the discharge of its duties.

SEC. 9. That the said board, on or before the first day of December in each year, shall make a report in writing to the governor, upon the vital statistics and the sanitary condition and prospects of the State, which report shall also set forth the action of said board, and its officers and agents, and the names thereof for the past year, and shall contain a full statement of their acts, investigations, and

discoveries, with such suggestions for further legislative action or other precautions as they may deem proper for the better protection of life and health. This report shall also contain a detailed statement of the moneys expended by said board, and the manner of their expenditure the year for which it is made; but the total amount paid for the expenses of this board, including the salary and expenses of the secretary, shall not exceed three thousand dollars, which amount is hereby annually appropriated for this purpose, to be paid by the treasurer, on the comptroller's warrant, in such sums as the certificate of the board, with proper vouchers annexed, may certify from time to time.

Sec. 10. That this act shall take effect from the date of its passage; and that all acts or parts of acts inconsistent herewith be, and the same are hereby, repealed.

REGISTRATION LAWS.*

Section 1. Every registrar of births, marriages, and deaths shall hold office for one year from the first Monday in January next succeeding his appointment, and until his successor is appointed and qualified.

Sec. 2. The registrar shall ascertain, as accurately as he can, all the births, marriages, and deaths occurring in his town, and record the same in a book or books kept by him for that purpose, in such form and with such particulars as shall be, prescribed by law. He shall give licences to marry, according to the provisions of law, and shall make and perfect all records of the birth of any child born in his town. He shall record in the books furnished by the Bureau of vital statistics such facts concerning the births, marriages, and deaths in his town as may be therein required; and he shall amend his records as he may discover omissions or mistakes therein; annually, on or before the twenty-fifth day of January, shall send the superintendent of vital statistics an attested abstract of said records for the year next preceding the first day of said January, which shall be made in such form as shall be prescribed by said superintendent, and shall deposit a true copy thereof with the town clerk.

Sec. 3. Every physician or midwife, who shall have professional charge of the mother at the birth of any child, and every attendant who may act as midwife at such a time, where no physi-

* The following provisions are compiled from the unrepealed portions of the different statutes.

cian or midwife is employed, shall, during the first week of the month next succeeding such birth, furnish the registrar of the town wherein such birth may have taken place a certificate signed by such physician, midwife, or attendant, stating, from the best information which the signer of said certificate can obtain, the facts required by the Bureau of Vital Statistics.

AN ACT CONCERNING THE REGISTRATION OF BIRTHS, MARRIAGES, AND DEATHS.

SECTION 1. The registrar, for completing each record of birth by inserting the full name of the child, shall receive from the town ten cents, and for ascertaining, recording, and indexing each birth of which no certificate has been furnished, fifty cents.

SEC. 2. Every physician residing without the town wherein a birth or death occurred under his charge shall make return thereof to the registrar of such town, and he shall receive therefor from the registrar an order on the treasurer of such town for the fee prescribed by law.

SEC. 3. No deceased person shall be buried in any town having an incorporated city within its limits until a burial permit, stating the place of burial and that the certificate of death required by law has been returned and recorded, has been given by the registrar, who upon receipt of such certificate shall issue such permit; and upon application, when permits are required, the attending physician of the deceased, and the coroner in case of an inquest, shall give such certificate; or if there be no attending physician, or his certificate cannot be obtained early enough, or where immediate burial is required, any member of the local board of health, or any physician employed to have charge of the poor of said town or city, shall give such certificate to the best of his knowledge and belief, and the registrar shall record the place of any burial other than in a public cemetery, and for each permit shall receive twenty-five cents from the town.

SEC. 4. In all towns the secretary or committee of each cemetery association shall report to the registrar of the town in which such cemetery is situated the name of the sexton at present in charge of such cemetery, and of any change hereafter.

SEC. 5. Every person having charge of any burial-place shall during the first week of every month return a list, for which he shall receive fifty cents, of all the interments, disinterments, and removals made by him during the next preceding month, with the

date thereof, to the registrar of the town, who shall record the same in a book to be furnished by the bureau of vital statistics.

Sec. 6. Every person violating any of the provisions of this act shall be punished by a fine not exceeding twenty-five dollars.

Sec. 7. All acts and parts of acts inconsistent herewith are hereby repealed.

Approved, March 28, 1879.

AN ACT RELATING TO RETURNS OF DIVORCES.

Section 1. The returns of divorces required of clerks of the superior court to the State librarian, by section three, part sixteen, chapter one, title three of the general statutes, shall hereafter be made to the secretary of the State board of health, which returns shall be tabulated and published in the annual report of said board.

Sec. 2. This act shall take effect from its passage.

Approved, March 28, 1879.

TOWN OR CITY BY-LAWS.

Any town or city may enact by laws, not contrary to law, more effectually to obtain a perfect registration of births, marriages, and deaths; and the registrar of the town in which such by-laws may be enacted shall execute their provisions under the same oath and penalty as if they were the statute laws of the State.

FEES.

Registrars of births, marriages, and deaths shall receive for ascertaining and recording each birth, marriage, or death ten cents; for issuing a certificate of license for marriage, fifty cents; for making an abstract, two dollars; for each name on such abstract over two hundred, two cents.

No person shall open any grave for the disinterment of the body of any deceased person, in any public or private cemetery or burial-place, or disinter or remove such dead body from the town in which the death took place, without having procured from the registrar a permit therefor.—Feb. 28, 1877.

DISINTERMENTS.

On the receipt by the registrar of a certificate of death, properly made in the form furnished by the superintendent of vital statistics, the registrar shall issue a permit for the disinterment or

removal of the body of any deceased person, stating therein the locality of the interment, disinterment, or removal. No permit for the disinterment of the body of any deceased person during the months of June, July, August, or September shall be issued, except when required for the purposes of a legal investigation.

Every registrar of births, marriages, and deaths shall receive for issuing each permit as herein provided the sum of twenty-five cents.—Feb. 28, 1877.

RETURNS OF BIRTHS AND DEATHS.*

Duties of Persons who Shall Make Returns of Births and Deaths to the Registrars.

BIRTHS.

Physicians or midwives, or any person acting as midwife at the birth of a child, should make return of the same, upon the blanks furnished by the registrar, within the first week of the month next succeeding such birth, signed by the person making the returns, stating the facts therein required from the best information which the signer can obtain. Each birth should be promptly reported; and the record of the namo inserted afterwards. Parents should be instructed to report the name to the physician or registrar as soon as determined. A provision is made for a fee for the registrar on completion of an imperfect record.

DEATHS.

It is the duty of the attending physician to report on the blanks furnished by the registrar each death, with all the facts required by law. In cities, this certificate of death should be in the hands of the registrar before a burial permit is issued. There is no other way to secure complete returns of deaths in populous places than by the system of burial permits. The testimony is unanimous on this point. By reference to the bulletins of the National Health Board it will be seen that the cities which do not require a burial permit previous to interment are rapidly becoming exceptional. The attention of physicians is respectfully urged to the requirement for promptly filling out certificates of death. A little care on their part will save a great deal of unnecessary friction. If the cause of death be written in by the physician, and the cer-

*The following suggestions concerning the provisions of the registration laws are given in reply to questions that have been submitted.

tificate signed by him, the other facts can be readily filled out by the undertaker.

It is the duty of the physician to sign the certificate of death *forthwith.* The friends of the deceased should secure from the attending physician as soon as may be after death the certificate required by law, and furnish it to the registrar, who shall then issue the permit for burial. Proper respect for the dead demands at least that much attention be paid to their memory. The friends of the deceased are the proper persons to arrange this matter, to see that the facts concerning the last event in life about which the State concerns itself with relation to each citizen be correctly stated. The business and social elements involved also justify the utmost precision and care. Protection of life and prevention of crime are also involved in this transaction.

Where burial permits are not required, the physician should return the certificates of death each month to fulfill the requirements of the law. Negligence here is by far too common.

COMPENSATION.

The fee for returning the certificates of birth and death is twenty-five cents. The penalty for violation or non-compliance with the registration laws relating to returns of births and deaths, is not less than ten dollars, nor more than twenty-five dollars.

DUTIES OF PERSONS BEFORE WHOM MARRIAGES MAY BE SOLEMNIZED.

AUTHORITY AND ITS LIMITATIONS.

All judges, justices of the peace, and ordained or licensed clergymen belonging to this State or any other State, so long as they continue in the work of the ministry, may join persons in marriage, and all marriages attempted to be celebrated by any other person shall be void; but all marriages which shall be solemnized according to the forms and usages of any religious denomination in this State shall be valid.

Marriage within a certain degree of consanguinity is by law declared void.

CERTIFICATE OF LICENSE FOR MARRIAGE REQUIRED PREVIOUSLY TO THE CEREMONY.

No clergyman or magistrate is authorized to solemnize a marriage until a certificate of license is first delivered to him, under

penalty of a fine of not more than five hundred dollars, or imprisonment, one or both. The marriage license can be used only in the town where it was issued; if used in any other town, the officiating clergyman or magistrate is liable to a fine of not less than one hundred dollars, or imprisonment, one or both.

RECORD AND RETURN REQUIRED.

Every clergyman or magistrate is required by law to return to the registrar, within the first week of the month next ensuing, the license certificates, with the fact, time, and place of each marriage certified thereon for all marriages celebrated by him during the month preceding, under a penalty of ten dollars for each omission.

The certificate should be signed with name and official title.

LAWS CONCERNING MARRIAGE.

(General Statutes, Title XIV.)

Chap. I.

Section 1. Marriage between certain relatives prohibited.

Sec. 2. No person shall be married until one of them shall inform the registrar of the town in which the marriage is to be celebrated, or in case of his inability the town clerk, of the name, age, color, occupation, birth-place, residence, and condition (whether single, or widowed, divorced) of each. Such registrar or town clerk shall thereupon issue his certificate that the parties therein named have complied with the provisions of this section, which certificate shall be a license to any person authorized to celebrate marriage to join in marriage within said town only the parties therein named; but no such certificate shall be issued if either of the parties is a minor under the control of parent or guardian, until such parent or guardian shall give to the registrar or town clerk his written consent; and any registrar or town clerk who shall knowingly issue such certificate without such consent shall forfeit to the State one hundred dollars. Any person who shall join any persons in marriage without having received such certificate shall forfeit one hundred dollars.

Sec. 3. Every person who shall join any person in marriage shall certify upon the license certificate the fact, time, and place of such marriage, and return it to the registrar of the town where it was issued, upon or during the first week of the month next succeed-

ing such marriage, and upon failure thereof shall forfeit ten dollars. The penalties for joining persons in marriage in violation of this and the preceding section shall be paid to the town where the offense is committed, and the registrar shall sue therefor.

Sec. 4. The certificates required by the preceding section of this chapter shall be *prima facie* evidence of the facts therein stated.

Sec. 5. All judges, justices of the peace, and ordained or licensed clergymen belonging to this State or any other State, as long as they continue in the work of the ministry, may join persons in marriage; and all marriages attempted to be celebrated by any other person shall be void; but all marriages and rites which shall be solemnized according to the forms and usages of any religious denomination in the State shall be valid.

Title 20. Chap. II.

Sec. 17. Every person who shall knowingly publish a false and fictitious notice of any birth, marriage, or death shall be fined not more than one hundred dollars, or imprisoned not more than six months.

Chap. VII.

Sec. 2. Penalty for bigamy: imprisonment in State Prison not more than five years.

Sec. 3. Every man and woman who shall marry within any of the degrees of kindred specified in the first section, Chapter I, Title XIV, shall be imprisoned in the State Prison not less than two nor more than five years.

Sec. 21. Whoever undertakes to join persons in marriage, knowing that he is not authorized so to do, shall be fined not more than five hundred dollars, or imprisoned not more than one year, or both.

DUTIES OF REGISTRARS.

The registrar is the executive officer in each town for the registration laws, and it is his duty to see that they are complied with. It is his duty to make his record as complete as he can. Special provision is made by the act of 1879 for the completion of returns of births by securing the name of the child. The records of births are of little worth without the name.

In cities he is to issue burial-permits when required by law, and also permits for removal from one town to another. In case of disinterment or removal from one cemetery to another in the same town a permit is not required.

He shall record the facts required by law concerning births, marriages, and deaths in the record books furnished by the State, and should refuse to receive a certificate, glaringly defective, as a satisfactory performance of the returns required by law. Where the required facts are manifestly unobtainable, of course a virtue must be made of necessity, and the incomplete returns accepted.

It is the duty of the registrar to issue marriage licenses on receiving a declaration of intention of marriage from one of the parties, and to record all marriages returned to him as solemnized in his town. In case of his inability the town clerk shall perform these duties.—*General Statutes, Title 3. Part V, Sec. 2.* The registrar is forbidden by law, under penalty of one hundred dollars, to issue a marriage license when either of the parties is a minor, under the control of a parent or guardian, unless such parent or guardian shall give to the registrar his written consent.

DUTIES OF SEXTONS.

Every person having charge of a burial place shall return to the registrar a monthly list of all interments, disinterments, and removals, in case there be any during the month. For such list he is entitled to a fee of fifty cents from the town.

TITLE XIV, CHAPTER III.

Divorce.

Sec. 2. The party aggrieved may prefer a petition to the Superior Court, accompanied with a summons, signed by competent authority, notifying the defendant to appear before the court, which shall be duly served on the other party; and on proof of the allegations, said court may grant a divorce, and declare the petitioner to be single and unmarried; and the parties divorced may then marry again.

Sec. 3. On all such petitions, where the adverse party resides out of, or is absent from, this State, any judge or clerk of the Supreme Court of Errors, or of the Superior Court, or any County Commissioner may, in vacation, make such order of notice to the adverse party, as he shall deem reasonable; and such notice having been given, and duly proved to the court, it may proceed to the hearing of such petition at the first term, if it finds that the defendant has actually received notice that the petition is pending; and if it shall not appear that the defendant has had such notice, the court shall order such notice to be given as it may deem rea-

sonable, and continue the petition until the order has been complied with.

Sec. 4. If the petitioner shall not have continuously resided in this State three years next before the date of the petition, it shall be dismissed, unless the cause of divorce shall have arisen subsequently to the removal into this State, or unless the adverse party shall have continuously resided in this State three years next before the date of the petition, and actual service shall have been made upon him, or unless the alleged cause is habitual intemperance, intolerable cruelty, and the petitioner was domiciled in this State at the time of the marriage, and before bringing the petition has returned to this State, with the intention of permanently remaining. *

Sec. 5. The Superior Court may assign to any woman so divorced part of the estate of her late husband, not exceeding one-third, and may change her name.†

Sec. 6. When any married woman shall have derived from her husband, in consideration of their marriage, or of love and affection, any estate, and her husband shall thereafter be divorced from her on the ground of her misconduct, the court may decree that such personal estate remaining in her possession, and such real estate standing in her name, shall thereafter belong to him.

Sec. 7. On any petition by a woman for a divorce, the court may at any time make any proper order as to custody, care, and education of the children, and may at any time thereafter annul or vary such order.

Sec. 8. In all cases in which a divorce has been or shall be granted on the application of a woman, without any order being made at the time of granting such divorce, relative to the custody of the children, and in all cases in which any husband and wife, having minor children, shall, by reason of the abandonment or cruelty of the husband, live separately, the Superior Court in the county where the parties, or one of them, reside, may, on the application of the mother, and due notice given to the husband, award the custody of the children to the mother, for such time, and under such regulations as it may deem proper.

Sec. 9. Upon the dissolution of any marriage by divorce, the parents of a minor child of such marriage, in need of maintenance,

* Three years' residence, when the alleged cause is intemperance. 17 Conn., 284.

† A specific sum in money, not exceeding one-third of the husband's property, may be allowed as alimony. 5 Day, 353; 21 Conn., 185. Writ of *ne exeat* the remedy to enforce payment. *Ibid.*

shall maintain it according to their respective abilities, and upon the application of either parent, then or thereafter made to the Superior Court, it shall inquire into their pecuniary ability, and may make and enforce such decree against either or both of them, for the maintenance of such child, as it shall consider just, and may direct any proper security to be given therefor.*

CHAPTER LXXI. MARCH, 1878.

An Act relating to Divorce.

SECTION 1. The Superior Court shall havo exclusive jurisdiction of all petitions for divorce, and may grant divorces to any man or woman for the following offenses committed by the other party, to wit: Adultery, fraudulent contract, willful desertion for three years, with total neglect of duty, seven years' absence during all of which period the absent party has not been heard from, habitual intemperance, intolerable cruelty, sentence to imprisonment for life, any infamous crime involving a violation of conjugal duty, and punishment by imprisonment in the state prison.

SEC. 2. Section one, chapter three, title fourteen of the general statutes of Connecticut is hereby repealed.

SEC. 3. This act shall not affect any petition for divorco now pending.

CHAPTER XXIII. 1880.

No complaint praying for a divorce shall be heard or any decree granted thereon until after the expiration of ninety days from the day on which such complaint is made returnable. March 9, 1880.

CHAPTER LXX. 1875.

Every person who shall violate any of the provisions relating to the registration of births, marriages, and deaths, shall pay for every such offense a fine of ten dollars to the use of the town wherein such offense is committed.

PROPOSED LAWS.

The following amendments are recommended by the State Board of Health.

To SECTION I, TITLE 16, CHAPTER XI.

SECTION 1. The justices of the peace and selectmen of any town

* After a divorce, the parties are liable to support the children in proportion to their pecuniary ability. 22 Conn., 411.

may be called together as a Board of Health at any time, upon a written application signed by two reputable citizens of said town, made to any one of the members of said Board of Health. The application may be sent by mail, and upon its receipt said member of the Board of Health shall forthwith summon a meeting of the justices of the peace and selectmen as a Board of Health, by sending a written notice to each member thereof, of the time and place said meeting is to be held.

Sec. 2. The health committees, appointed in accordance with section 1, title 16, chapter XI, shall have power to make all necessary rules and regulations for the preservation of the public health and abatement of nuisances not inconsistent with the laws of this state, and subject to the approval of the full Board of Health.

In Amendment to Section 13.

Sec. 1. Any lodging-house keeper, hotel keeper, or householder in whose dwelling shall occur a case of cholera, yellow fever, malignant diphtheria, malignant scarlet fever, or small-pox shall immediately notify the Board of Health of the same within twenty-four hours of its occurrence. The Board of Health shall, if they find it necessary, quarantine the case or order its removal, in case of small-pox, yellow fever or cholera, as they deem necessary, and shall direct the disposal and disinfection of all infected articles. The Board of Health shall also direct the attendance or non-attendance upon school or other public assemblages of persons living in said house during the continuance of a malignant contagious disease, and also, in case of convalescence, the time when the patient is free from danger of communicating the disease to others. Any physician in attendance upon any person sick with any of the above-mentioned diseases shall forthwith report the same to the Board of Health. Any person violating the provisions of this section shall be liable to a fine of ten dollars for the first offense, and not less that fifty dollars for the second offense, or by imprisonment not less than twenty days.

Sec. 2. No person liable to propagate any of the diseases mentioned in section 1 shall be brought within the limits of any town, city, or borough in this state, without the special permit of the Board of Health and in obedience to the directions thereof. If it shall come to the knowledge of any one that such infected person has been brought within such limits, he shall at once give notice thereof to said Board of Health.

SEC. 3. The Board of Health shall give public notice when any contagious disease is epidemic, and in such case may forbid all public funerals of persons dying with the epidemic disease, and direct such measures for disinfection as may be needful to protect the public health and safety. In case of inability to provide such disinfectants, or where a general use is necessary, the Board of Health shall cause such disinfection to be carried out at the expense of the town in which the epidemic occurs. The Board of Health shall designate a place where such disinfectants can be procured at reasonable rates, and provide plain directions for their use, as well as arrange for the necessary supplies to be kept on hand.

SEC. 4. Any physician or person assuming to act as such, who shall issue a false certificate whereby a case of malignant or contagious disease may be concealed, shall be fined not less than fifty dollars and shall be deemed guilty of a misdemeanor, and the ignorance of a practitioner shall not be pleaded in extenuation of his offense.

SEC. 5. Any person knowingly laboring under small-pox or other pestilential disease, who shall wilfully enter a public place or public conveyance or shall in any other way wilfully subject others to danger of contracting this diseasc, or any person who shall knowingly and wilfully subject others to the danger of contracting any of the diseases mentioned in section 1 from the dead body of a person deceased thereof, shall be deemed guilty of a misdemeanor. Any person who shall wilfully or knowingly conceal the existence of any of the diseases mentioned in section 1 shall be deemed guilty of a misdemeanor, and fined not less than twenty-five dollars nor more than one hundred dollars or imprisoned for thirty days, or shall suffcr such fine and imprisonment both.

SEC. 6. It shall be the duty of all physicians who may be in attendance in any family whose child or children may be attending any public school, which family may have a case or cases of scarlet fever, diphtheria, measles, or small-pox, to give a certificate of the same to the parents or guardian of the child or children as soon as the disease is developed, and it shall be the duty of said parents or guardian to notify at once the school authorities of the school attended by said children. If no physician be in attendance, it shall be the duty of the parents or guardian to notify the school authorities of the existence of such disease.

SEC. 7. Upon receipt of such notice, it shall be the duty of said school authorities to exclude the child or children of such fam-

ilies from the school until the attending physician certifies that all danger from contagion has passed. If any teacher or teachers become cognizant of the existence of the diseases named in section 6, or other contagious disease, in any house from which children attend said school, it shall be their duty forthwith to report the same to the school authorities. Any person violating the provisions of sections 6 and 7 shall be fined ten dollars for every offense.

An Act for Disinfectants in Prisons and Jails.

Sec. 1. The state prison directors and the sheriffs of the various counties in this state are hereby authorized and directed to cause to be purchased, disinfectants at an expense not to exceed one cent per day for the time they may be used, for each and every cell in each and every prison or jail under their respective charge, and direct the application thereof as often as the physicians of these institutions may deem necessary.

The following is essentially the New York state law with regard to vaccination.

Sec. 1. The Board of Health of any town is hereby empowered and directed to exclude from the benefits of the common schools therein any child or any person who has not been vaccinated, and until such time said child or person shall become vaccinated.

Sec. 2. The Board of Health in each town shall appoint a competent physician and fix his compensation, who shall vaccinate at the expense of the town any child or person of suitable age, who shall desire to attend the common schools, and whose parents or guardians are unable to provide vaccination for them ; also those who may desire him to vaccinate their children, and the children of such parents as are exempt from taxation. Said physician shall give certificates of vaccination to those he vaccinates and to all children that he finds properly vaccinated, and such certificates shall be received by the school authorities as evidence of proper vaccination, in compliance with section first thereof. The certificate of proper vaccination from the family physician of the parents of any child, shall be also accepted as compliance with this act. It shall be the duty of the physician appointed in any town under this section to provide himself with reliable *bovine* vaccine virus from *some reputable producer.* He shall keep a list of all children vaccinated and the date.

SEC. 3. Whenever the Boards of Health of any town shall adopt a resolution, to carry into effect the power conferred in section first, they shall give at least ten days' notice thereof, by posting the same in two or more conspicuous places and upon the public sign post, and shall in such notice advertise that a general inspection and vaccination of all unvaccinated is to be provided, and that certificates of vaccination will be required at the opening of the school term.

SEC. 4. The necessary expenses of the execution of the provisions of this act shall be paid as are other town expenses.

SLAUGHTERING HOUSES AND NUISANCES.

SEC. 1. No person in any town containing within its limits an incorporated borough or city shall erect, occupy, or use any building for carrying on therein the business of slaughtering cattle, sheep, or other animals, or for melting, rendering, or other noxious or offensive trades and occupations, without first obtaining a written permit from the court of common council of said city, or the warden and burgesses of said borough. No person now occupying or using any building or premises for any of the purposes above mentioned shall enlarge or extend the same without first obtaining a permit therefor in the same manner as hereinbefore provided.

SEC. 2. Any person violating the provisions of the preceding section shall pay a fine of not less than fifty dollars, and for every day that he shall persist after due notice to cease and desist shall pay a fine of ten dollars.

The following is printed at the request of the National Board of Health; it has been enacted in New York and one or more other States.

(N. B.—This Bill, proposed for enactment by State Legislatures severally, was prepared at the instance of the NATIONAL BOARD OF TRADE, by a Committee of Experts, consisting of the following gentlemen: Dr. John S. Billings, U. S. A., Vice-President of the National Board of Health; Professor Charles F. Chandler, President of the New York Board of Health; the Hon. Ex-Chancellor B. Williamson, of New Jersey; and Alpheus H. Hardy, Esq., of Boston.)

A BILL TO PREVENT THE ADULTERATION OF FOOD OR DRUGS.

SECTION 1. That no person shall, within this State of manufacture, have, offer for sale, or sell any article of food or

drugs which is adulterated within the meaning of this Act, and any person violating this provision shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine not exceeding

Sec. 2. The term "food" as used in this Act shall include every article used for food or drink by man.

The term "drug" as used in this Act shall include all medicines for internal or external use.

Sec. 3. An article shall be deemed to be adulterated within the meaning of this Act—

a.—In the case of drugs.

1. If, when sold under or by a name recognized in the United States Pharmacopœia, it differs from the standard of strength, quality, or purity laid down therein.

2. If, when sold under or by a name not recognized in the United States Pharmacopœia, but which is found in some other pharmacopœia or other standard work on Materia Medica, it differs materially from the standard of strength, quality, or purity laid down in such work.

3. If its strength or purity fall below the professed standard under which it is sold.

b.—In the case of food or drink.

1. If any substance or substances has or have been mixed with it so as to reduce or lower or injuriously affect its quality or strength.

2. If any inferior or cheaper substance or substances have been substituted wholly or in part for the article.

3. If any valuable constituent of the article has been wholly or in part abstracted.

4. If it be an imitation of or sold under the name of another article.

5. If it consist wholly or in part of a diseased or decomposed, or putrid, or rotten animal or vegetable substance, whether manufactured or not, or in the case of milk, if it is the produce of a diseased animal.

6. If it be colored, or coated, or polished, or powdered, whereby damage is concealed, or it is made to appear better than it really is, or of greater value.

7. If it contain any added poisonous ingredient, or any ingredient which may render such article injurious to the health of a person consuming it: *Provided*, That the State Board of Health

may, with the approval of the Governor, from time to time declare certain articles or preparations to be exempt from the provisions of this Act: *And provided further*, That the provisions of this Act shall not apply to mixtures or compounds *recognized* as ordinary articles of food, provided that the same are not injurious to health, and that the articles are distinctly labeled as a mixture, stating the components of the mixture.

SEC. 4. It shall be the duty of the State Board of Health to prepare and publish from time to time lists of the articles, mixtures, or compounds declared to be exempt from the provisions of this Act in accordance with the preceding section. The State Board of Health shall also from time to time fix the limits of variability permissible in any article of food, or drug, or compound the standard of which is not established by any National Pharmacopœia.

SEC. 5. The State Board of Health shall take cognizance of the interests of the public health as it relates to the sale of food and drugs and the adulteration of the same, and make all necessary investigations and inquiries relating thereto. It shall also have the supervision of the appointment of public analysts and chemists, and upon its recommendation, whenever it shall deem any such officers incompetent, the appointment of any and every such officer shall be revoked and be held to be void and of no effect. Within thirty days after the passage of this Act, the State Board of Health shall meet and adopt such measures as may seem necessary to facilitate the enforcement of this Act, and prepare rules and regulations with regard to the proper methods of collecting and examining articles of food or drugs, and for the appointment of the necessary inspectors and analysts; and the State Board of Health shall be authorized to expend, in addition to all sums already appropriated for said Board, an amount not exceeding for the purpose of carrying out the provisions of this Act.

SEC. 6. Every person selling or offering or exposing any article of food or drugs for sale, or delivering any article to purchasers, shall be bound to serve or supply any public analyst or other agent of the State or local Board of Health appointed under this Act, who shall apply to him for that purpose, and on his tendering the value of the same, with a sample sufficient for the purpose of analysis of any article which is included in this Act, and which is in the possession of the person selling, under a penalty not exceeding $50 for a first offence, and $100 for a second and subsequent offences.

Sec. 7. Any violation of the provisions of this Act shall be treated and punished as a misdemeanor; and whoever shall impede, obstruct, hinder, or otherwise prevent any analyst, inspector, or prosecuting officer in the performance of his duty shall be guilty of a misdemeanor, and shall be liable to indictment and punishment therefor.

Sec. 8. Any Act or parts of Acts inconsistent with the provisions of this Act are hereby repealed.

Sec. 9. All the regulations and declarations of the State Board of Health made under this Act, from time to time and promulgated, shall be printed in the Statutes at large.

Sec. 10. This Act shall take effect at the expiration of ninety days after it shall become a law.

Removal of Bodies of Persons Dying with Contagious Diseases.

Section 1. No dead body of any person shall be removed from any town in this state unless a permit be obtained therefor from the registrar of births, marriages, and deaths, of said town. The permit shall state the name, age, and sex of the deceased and the disease from which death occurred. The physician in attendance upon the deceased at the last illness, shall upon application forthwith make out and sign the certificate of the cause of death required by law, and in case no physician was in attendance, the chairman or some member of the board of health of said town shall make out and sign said certificate. No permit for removal shall be issued by any registrar until said certificate of death is received by him.

Sec. 2. In case of death from any malignant contagious disease, said removal permit shall be provided with a coupon upon which shall be certified by the undertaker in charge of said body, that it is hermetically sealed in a metallic air-tight coffin, or thoroughly and properly disinfected. It shall be the duty of the Bureau of Vital Statistics to provide and furnish to registrars such permits, with plain directions for disinfection printed upon the back.

Sec. 3. No public carriers nor incorporated transportation companies nor private carriers, of whatsoever name or nature, shall receive for transportation nor transport the body of any person, except upon receipt of the removal permit as required by the preceding sections.

The following law has worked well in Massachusetts for several years, and is here printed for consideration, in view of the evils of the present system as shown in recent trials in cases of violent deaths:

An Act to abolish the office of Coroner and to provide for Medical Examinations and Inquests in Cases of Death by Violence.

SECTION 1. The offices of coroner and special coroner are hereby abolished, and all powers conferred upou justices of the peace to act as coroners revoked.

SEC. 2. The Governor shall appoint, by and with the advice and consent of the Senate, in the county of New Haven, not exceeding three, and in each county not exceeding the number to be designated by the county commissioners, as hereinafter provided, able and discreet men, learned in the science of medicine, to be medical examiners, and every such nomination shall be made at least seven days prior to such appointment.

SEC. 3. In the counties of Hartford, New Haven, Fairfield, and New London each medical examiner shall receive an annual salary of one thousand dollars in full for all services performed by him, to be paid quarterly from the treasury of said county, and in other counties they shall receive for a view without an autopsy, five dollars; for a view and autopsy, thirty dollars, and mileage at the rate of five cents per mile to and from the place of view, if the town can be reached by railroad, if not, he shall be paid also all necessary traveling expenses to and from the place of view.

SEC. 4. Medical examiners shall hold their offices for the term of seven years from the time of appointment, but shall be liable to removal from office at any time by the Governor for cause shown.

SEC. 5. Each medical examiner, before entering upon the duties of his office, shall be sworn and give bond, with sureties in the sum of five thousand dollars, to the treasurer of the county, conditioned for the faithful performance of the duties of his office. If a medical examiner neglects or refuses to give bond as herein required, for the period of thirty days after his appointment, the same shall be void and another shall be made instead thereof.

SEC. 6. The county commissioners in each county shall, as soon as may be after the passage of this act, divide their several counties into suitable districts for the appointment of one medical examiner in each district under this act; and when such division is made, shall at once certify their action to the secretary of the

commonwealth, who shall lay such certificate before the governor and council; but nothing herein shall prevent any medical examiner from acting as such in any part of his county.

SEC. 7. Medical examiners shall make examinations as hereinafter provided, upon the view of the dead bodies of such persons only as are supposed to have come to their death by violence.

SEC. 8. Whenever a medical examiner has notice that there has been found, or is lying within his county, the dead body of a person who is supposed to have come to his death by violence, he shall forthwith repair to the place where such body lies and take charge of the same; and if on view thereof and personal inquiry into the cause and manner of the death, he deems a further examination necessary, he shall, upon being thereto authorized in writing by the district attorney, mayor, or selectmen of the district, city, or town where such body lies, in the presence of two or more discreet persons, whose attendance he may compel by subpœna if necessary, make an autopsy, and then and there carefully reduce or cause to be reduced to writing every fact and circumstance tending to show the condition of the body, and the cause and manner of death. together with the names and addresses of said witnesses, which record he shall subscribe. Before making such autopsy he shall call the attention of said witnesses to the position and appearance of the body.

SEC. 9. If upon such view, personal inquiry, or autopsy, he shall be of opinion that the death was caused by violence, he shall at once notify the district attorney and a justice of the district, police, or municipal court for the district or city in which the body lies, or a trial justice, and shall file a duly attested copy of the record of his autopsy in such court, or with such justice, and a like copy with such district attorney; and shall in all cases certify to the clerk or registrar having the custody of the records of births, marriages, and deaths in the city or town in which the person deceased came to his death, the name and residence of the person deceased, if known, or a description of his person, as full as may be for identification, when the name and residence cannot be ascertained, together with the cause and manner in and by which the person deceased came to his death.

SEC. 10. The court or trial justice shall thereupon hold an inquest, which may be private, in which case any or all persons other than those required to be present by the provisions of this chapter may be excluded from the place where the same is

held; and said court or trial justice may also direct the witnesses to be kept separate, so that they cannot converse with each other until they have been examined. The district attorney or some person designated by him may attend the inquest and may examine all witnesses. An inquest shall be held in all cases of death by accident upon any railroad; and the district attorney or the attorney-general may direct an inquest to be held in the case of any other casualty from which the death of any person results, if in his opinion such inquest is necessary or expedient.

SEC. 11. The justice or district attorney may issue subpœnas for witnesses, returnable before such court or trial justice. The persons served with such process shall be allowed the same fees, and their attendance may be enforced in the same manner, and they shall be subject to the same penalties, as if served with a subpœna in behalf of the commonwealth in a criminal prosecution pending in said court, or before said trial justice.

SEC. 12. The presiding justice or trial justice shall, after hearing the testimony, draw up and sign a report in which he shall find and certify when, where, and by what means the person deceased came to his death, his name if known, and all material circumstances attending his death; and if it appears that his death resulted wholly or in part from the unlawful act of any other person, he shall further state, if known to him, the name of such person and of any person whose unlawful act contributed to such death, which report he shall file with the records of the superior court in the county wherein the inquest is held.

SEC. 13. If the justice finds that murder, manslaughter, or an assault has been committed, he may bind over, as in criminal prosecutions, such witnesses as he deems necessary, or as the district attorney may designate, to appear and testify at the court in which an indictment for such an offense may be found or presented.

SEC. 14. If a person charged by the report with the commission of any offense is not in custody, the justice shall forthwith issue process for his apprehension, and such process shall be made returnable before any court or magistrate having jurisdiction in the premises, who shall proceed therein in the manner required by law; but nothing herein shall prevent any justice from issuing such process before the finding of such report if it be otherwise lawful to issue the same.

SEC. 15. If the medical examiner reports that the death was

not caused by violence, and the district attorney or the attorney-general shall be of a contrary opinion, either the district attorney or the attorney-general may direct an inquest to be held in accordance with the provisions of this act, notwithstanding the report, at which inquest he, or some person designated by him, shall be present and examine all the witnesses.

SEC. 16. The medical examiner may, if he deems it necessary, call a chemist to aid in the examination of the body or of substances supposed to have caused or contributed to the death, and such chemist shall be entitled to such compensation for his services as the medical examiner certifies to be just and reasonable, the same being audited and allowed in the manner herein provided. The clerk or amanuensis, if any, employed to reduce to writing the results of the medical examination or autopsy shall be allowed for his services two dollars per day.

SEC. 17. When a medical examiner views or makes an examination of the dead body of a stranger, he shall cause the body to be decently buried; and if he certifies that he has made careful inquiry, and that to the best of his knowledge and belief the person found dead is a stranger, having no settlement in any city or town of this commonwealth, his fees, with the actual expense of burial, shall be paid from the treasury of the commonwealth. In all other cases the expense of the burial shall be paid by the city or town, and all other expenses by the county, wherein the body is found.

SEC. 18. When services are rendered in bringing to land the dead body of a person found in any of the harbors, rivers, or waters of the commonwealth, the medical examiner may allow such compensation for said services as he deems reasonable, but this provision shall not entitle any person to compensation for services rendered in searching for such dead body.

SEC. 19. In all cases arising under the provisions of this act, the medical examiner shall take charge of any money or other personal property of the deceased, found upon or near the body, and deliver the same to the person or persons entitled to its custody or possession; but if not claimed by such person within sixty days, then to a public administrator, to be administered upon according to law.

SEC. 20. Any medical examiner who shall fraudulently neglect or refuse to deliver such property to such person within three days after due demand upon him therefor shall be punished by

imprisonment in the jail or house of correction not exceeding two years, or by fine not exceeding five hundred dollars.

Sec. 21. The medical examiner shall return an account of the expenses of each view or autopsy, including his fees, to the county commissioners having jurisdiction over the place where the examination or view is held, or in the county of Suffolk to the auditor of the city of Boston, and shall annex thereto the written authority under which the autopsy was made. Such commissioners or auditor shall audit such accouuts and certify to the treasurer of the commonwealth, or the treasurer of the county, as the case may be, what items therein are deemed just and reasonable, which shall be paid by said treasurer to the person entitled to receive the same.

Sec. 22. Whenever any sheriff is party to a writ or proceeding, or otherwise disqualified to act therein the sheriff or deputy-sheriff of any adjoining county may serve and execute all writs and precepts, and perform all duties of such sheriff which he is disqualified to perform, and may serve and execute all such writs and precepts wherein any county, town, borough, religious society, or school district is a party or interested, notwithstanding he is at the time a member of such corporation.

Sec. 23. Whenever a vacancy occurs in the office of sheriff of any county the senior deputy-sheriff in service shall perform all the duties required by law to be performed by the sheriff until the office of sheriff is filled in the manner required by law, giving bond as now required by law of sheriffs. And in case of such vacancies the deputies of the sheriff vacating the office shall continue to have and exercise the power of deputy-sheriffs until said office is filled as aforesaid.

Sec. 24. Chapter II, Title 16, and Chapter XXIII, Title 13, of the General Statutes, are hereby repealed, and all acts and parts of acts inconsistent with this are hereby repealed.

Sec. 25. This act shall take effect the first day of July, 1882.

State Board of Health.

BUREAU OF VITAL STATISTICS,

STATE OF CONNECTICUT.

REGISTRATION REPORT

FOR THE

Year Ending December 31, 1880.

NEW SERIES.—No. 3.

Printed by Order of the Legislature.

HARTFORD, CONN.:
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1881.

State of Connecticut.

OFFICE OF THE
BUREAU OF VITAL STATISTICS,
STATE HOUSE, HARTFORD, DEC. 31, 1880.

To his excellency, H. B. BIGELOW,
Governor of the State of Connecticut :

SIR : In accordance with the laws of this State, I have the honor to submit the Annual Registration Report relating to Births, Marriages, Deaths, and Divorces which occurred in the State of Connecticut during the year 1880.

Your very obedient servant,

C. W. CHAMBERLAIN, M.D.,
Superintendent of Registration of Vital Statistics.

State Board of Health

AND BUREAU OF VITAL STATISTICS.

Dr. JOHN S. BUTLER, Hartford, President.

Prof. C. A. LINDSLEY, M.D., New Haven.

Prof. W. H. BREWER, New Haven.

Hon. A. E. BURR, Hartford.

Dr. R. HUBBARD, Bridgeport.

Hon. A. C. LIPPIT, New London.

Dr. C. W. CHAMBERLAIN, Hartford, Secretary,

and Superintendent of Registration of Vital Statistics.

REGISTRATION REPORT.

1880.

The report for this year contains some new features that render it of greater value for reference, and in comparing the results in different years. No one that has not engaged in similar work can justly estimate the time and labor involved in the construction of these tables. The mere mechanical part in collecting the various facts from so many different sources is no small item—the computations, although not involving usually large figures, are often quite intricate, and absolute correctness must be secured as the same totals figure in several combinations. This work, too, is usually done by an array of clerks, but here we have had only the temporary assistance of one, which was absolutely necessary to secure completion within the time at our disposal. A few annoying typographical errors have crept in, otherwise it is believed no errors can be found. In one case a figure dropped out as the page went to press, and in two instances lines of figures are transposed.

The different nomenclature of diseases used until 1877 also renders the comparisons more difficult, as the two methods of classification differ essentially. The table of occupations appears for the first time; the returns are more meagre in this respect than in all others, as but little attention has been paid to the results when recorded the negligence is not strange; it is hoped that by a little effort as complete returns can be secured in this respect as in the other departments.

The mortality for 1880 is the largest yet recorded in any year; the completer returns and increased populations are partial factors, and a few localized epidemics contribute, but, when allowances are made for these, the total is still larger than usual. Similar results are found in the returns in other states, so that while the sanitary history of the year is not as satisfactory as it might be, this is not exceptional, but due to widespread influences. The mortality

from malarial diseases shows the greatest proportionate increase. The number of deaths from consumption is somewhat larger than the average. Typhoid fever and diarrhœal diseases generally show a considerably increased mortality, as is the case also with lung fever and acute lung diseases generally ; inflammatory heart affections also show an increase. In fine, all diseases influenced by climatic changes, variable temperatures, prolonged drought and the like make up the greater part of the increased mortality.

The law requiring burial permits in cities results in complete returns of all deaths from them. It is hoped that an enlightened public sentiment will enable us to extend this to the large towns. The failure to return the full name of the child, and the entire lack of returns of births and deaths from non-resident physicians are the most glaring evils connected with the registration system. The return of three or four deaths in a year from towns of two thousand population illustrates the results of the lack of returns from physicians residing in other towns.

There were recorded, in 1880, 13,829 births, 4,745 marriages, and 10,408 deaths ; 122 *less births* than 1879, 365 marriages *more*, and 1,014 deaths *more*. There were 332 divorces, 16 more than last year, but as the number of marriages is considerably increased, the ratio of divorces to marriages is better than last year ; this year it is one to every 14½ marriages ; in 1879, one to every 13.8; in 1878, one for every 10.6. So far the predictions concerning the probable effects of the repeal of the omnibus clause have apparently been reached ; time will show whether the reduction is permanent or due principally to this cause. Taking the same number of marriages as in 1878 or 1879 the ratio of divorces would still be one to every thirteen marriages instead of one to every ten, as in 1878. So that there is thus far an absolute reduction in divorces, even leaving out the increased number of marriages.

The excess of births over deaths is 3,421, which is 1,236 *less* than that of last year. This indicates a diminished gain in population, but not to that full amount, as the returns of births are not as complete as last year ; certain sources by which a large number of unrecorded births were ascertained last year were not again accessible. At least two-thirds of the 1,236 is due to unrecorded births, estimating from last year's results.

The population for the year, as given by a circular from the Census Bureau, is 622,693, which gives—

Births,	22.2 to every	1,000	population.
Marriages,	7.8	"	"	"
Deaths,	16.7	"	"	"

Excess of births over deaths, 5.5.

The daily average of natural increase was—

Daily average of births, male, 19.9, female, 17.7, total, 37.6.

"	marriages,	13.
"	deaths,	27.6
Average daily natural increase,		9.6
Daily excess of birth rate over death rate,		5.5

The average death rate to every thousand of population is not greatly in excess of that of 1879, when it was 15. This year it is 16.7, 1.7% larger. As before stated, this is the same in adjoining states relatively.

The following table shows the number of births, marriages, and deaths, from 1848, when the first registration report was issued by the State, to 1880 inclusive, the birth and death rates per 1,000 calculated by allowing a proportional increase for each one of the decennial years. This method is as nearly correct as any, except the somewhat complicated calculation by logarithmic tables, and is sufficiently accurate, although the increase is probably never exactly uniform each year. The natural increment of population taken alone does not make up the whole growth. In the method alluded to both of these factors are considered. The returns for the year 1851 are not obtainable, so that year is omitted in the table. The comparative tabulation of divorces commences with 1860, the first available records. The last column shows the number of divorces to each marriage; the best ratio is that of 1880, one divorce to every 14.2 marriages, the worst 1875, when there was one for every 9.2 marriages. The general average until the last two years, has been about one to every ten marriages:

Years.	Births.	Birth-rate per 1,000.	Marriages.	Deaths.	Death-rate per 1,000.	Excess of Births over Deaths.	Divorces.	No. of Marriages to each Divorce.
1848	6,850	20	2,816	4,379	12.4	2,471	...	...
1849	7,238	20	2,920	5,049	14	2,189	...	...
1850	7,578	20.4	2,884	5,170	14	2,408	...	...
1851	8,362	22	2,995	4,767	13	3,595	...	...
1852	8,302	21.4	3,136	5,596	14.4	2,706	...	...
1853	8,439	21.3	3,202	5,646	14.2	2,793	...	...
1854	10,012	24	4,286	6,094	14.6	3,918	...	...
1856	11,139	25	4,089	6,324	14.9	4,805	...	...
1857	11,355	26	3,747	6,585	16	4,770	...	...
1858	11,299	25	3,737	6,618	15.6	4,681	...	...
1859	11,259	25	3,778	6,533	15	4,726	...	...
1860	11,873	26	4,036	7,602	16.3	4,271	310	13
1861	11,934	25	3,757	7,735	16.5	4,199	275	13.9
1862	10,803	23	3,701	8,541	18	1,262	257	14
1863	9,885	21	3,467	8,442	18	1,443	291	12
1864	9,734	20	4,107	9,109	19	625	426	9.6
1865	10,202	20.8	4,460	7,950	16	2,252	404	11
1866	11,623	23	4,978	7,520	15	4,103	488	10
1867	12,029	23.2	4,779	7,343	14.3	4,676	459	10.4
1868	12,469	23.4	4,734	7,549	15	4,947	478	9.9
1869	12,481	23.5	4,754	8,417	15.6	4,064	491	9.6
1870	13,136	24.2	4,871	8,895	15	4,241	408	11.9
1871	13,114	24	4,882	8,166	14.2	4,948	409	11.9
1872	13,805	25.3	5,023	9,970	18	3,935	464	10.8
1873	14,087	25.6	4,841	9,822	17.4	4,265	457	10.6
1874	14,450	26.2	4,694	8,939	17.2	5,511	492	9.5
1875	14,328	26	4,385	9,833	17	4,485	476	9.4
1876	13,800	25	4,320	10,187	17.5	3,613	396	10.9
1877	14,072	26	4,319	9,696	16	4,376	427	10.1
1878	13,499	24	4,315	9,352	15	4,147	401	10.7
1879	14,051	22.4	4,373	9,394	15	4,657	316	13.7
1880	13,829	22.2	4,745	10,408	16.7	3,421	332	14.2

The highest birth rate is in 1874, the lowest 1864; the highest death rate 1864, lowest 1848. It is not probable, however, that the returns were as complete in the earlier years. The highest death rate and lowest birth rate occur the same year, near the close of the last war; they are very nearly the same. Were it not for this adequate cause the indications would be the reverse of prosperity; as it is, it shows the effect of the long struggle on the elements of natural increase.

TABLE I.

BIRTHS, MARRIAGES, AND DEATHS IN THE SEVERAL TOWNS, FOR THE YEAR ENDING DECEMBER 31, 1880.

HARTFORD COUNTY.

TOWNS.	Population in 1880.	BIRTHS.											MARRIAGES.								DEATHS.							
		Sex.					Parentage.														Sex.				Nativity.			
		Male.	Female.	Not stated.	Total.	Birth-rate per 1,000.	Both American.	Both Foreign.	Am. Mother, For. Father.	Am. Father, For. Mother.	Both For. of diff. Nations.	Not stated.	Both American.	Both Foreign.	H. Am., W. For.	H. For., W. Am.	Not stated.	Total.	Hus. non-resident.	Both non-resident.	Male.	Female.	Not stated.	Total.	American.	Foreign.	Not stated.	Death-rate per 1,000.
Hartford,....	42,553	575	442	1	1018	23.9	415	361	90	64	43	45	234	83	29	39	..	385	31	16	465	376	...	841	599	211	31	19.7
Avon,........	1,058	6	6	..	12	11.3	12	....	....	....	....	...	9	...	...	2	..	11	...	1	6	14	...	20	18	2	....	18.9
Berlin,........	2,385	30	13	..	43	18.	24	16	....	1	2	....	12	4	...	1	..	17	4	...	19	14	...	33	27	6	....	13.8
Bloomfield,....	1,346	7	5	..	12	8.9	9	1	1	....	1	....	9	1	1	....	..	11	1	1	9	7	...	16	14	2	....	11.8
Bristol,........	5,347	58	36	1	95	17.7	57	26	....	6	5	1	37	5	1	1	..	44	2	...	43	42	...	85	72	13	....	15.8
Burlington,....	1,224	13	14	..	27	22.	11	5	3	6	2	....	...	1	3	....	..	4	..	...	4	10	...	14	13	1	....	11.4
Canton,.......	2,299	41	39	..	80	35.6	33	44	....	1	2	....	20	7	3	1	..	31	2	1	34	28	...	62	48	14	....	26 9
East Granby,..	754	4	9	..	13	17.2	12	1	....	....	....	....	2	...	.	...	..	2	...	..	3	3	...	6	5	1	....	7.9
East Hartford,.	3,500	33	33	..	66	18.8	38	18	5	5	....	....	21	5	2	4	..	32	2	1	29	33	...	62	54	8	....	17.7
East Windsor,.	3,019	40	32	..	72	23.8	29	24	9	7	3	....	13	...	...	1	..	14	...	...	21	24	...	45	42	3	....	14.9
Enfield,.......	6,754	89	79	..	168	24.8	58	68	22	12	8	....	26	13	3	9	..	51	...	...	64	70	...	134	40	91	3	19.8
Farmington,...	3,014	31	19	..	50	16.5	24	13	....	6	4	3	7	...	...	1	..	8	1	...	16	22	...	38	32	5	1	12.6
Glastonbury,...	3,580	28	23	..	51	14.2	40	7	1	2	1	....	18	3	...	2	..	23	4	1	17	21	...	38	31	7	....	10.6
Granby,.......	1,340	14	8	..	22	16.4	20	2	....	....	....	....	7	...	...	...	..	7	2	..	7	9	...	16	16	....	....	11.9
Hartland,......	643	1	5	..	6	9.3	6	....	....	...	....	....	3	...	...	...	..	3	...	...	2	4	...	6	6	....	....	9.3
Manchester,....	6,462	93	73	1	167	25.8	59	72	10	15	11	....	27	36	3	5	.	71	4	...	55	56	...	111	82	29	....	17.1
Marlborough,..	391	2	4	..	6	15.3	6	....	...	....	....	...	1	...	...	...	..	1	...	...	6	1	...	7	7	....	....	17.8
New Britain,...	13,978	217	182	4	403	28.8	108	110	42	18	8	117	54	27	6	5	2	94	4	...	138	93	3	234	163	69	2	16.7
Newington,....	934	16	7	..	23	24.6	15	6	....	....	....	2	4	...	...	...	..	4	...	...	14	10	...	24	24	....	....	25.6
Plainville,.. ..	1,930	13	11	..	24	12.4	14	8	1	1	....	....	17	1	...	...	..	18	2	...	22	17	...	39	38	1	....	20.2
Rocky Hill,....	1,109	9	11	..	20	18.	15	2	....	2	1	....	4	...	...	...	..	4	...	...	4	5	...	9	9	....	....	8.1
Simsbury,.....	1,830	14	15	..	29	15.8	24	3	....	1	1	....	11	...	...	...	..	11	4	2	20	15	...	35	30	5	....	19.1
Southington,...	5,411	69	54	..	123	22.7	59	32	11	17	4	....	30	5	3	5	..	43	2	1	46	46	...	92	70	18	4	17.
South Windsor,	1,902	23	17	..	40	20.4	27	6	4	3	....	....	16	...	...	...	..	16	2	...	16	9	...	25	25	....	....	13.1
Suffield,.......	3,225	38	33	..	71	21.9	49	18	1	3	....	....	27	1	1	2	..	31	10	2	20	21	...	41	25	8	8	12 7
West Hartford,	1,838	9	14	..	23	12.5	18	2	1	1	1	....	8	...	...	...	..	8	1	...	11	11	...	22	21	1	....	12.
Wethersfield,...	2,173	12	14	..	26	11.9	23	1	....	2	....	....	10	...	...	...	..	10	...	1	25	13	...	38	31	5	2	17.9
Windsor,......	3 056	20	26	1	47	15.3	29	11	2	2	3	....	9	3	2	2	..	16	...	...	15	25	1	41	36	5	....	13.4
Windsor Locks,	2,332	19	29	..	48	20.	23	16	5	2	2	...	17	3	2	4	..	26	1	2	8	20	...	28	18	8	2	11.9
Total,.......	125,387	1524	1253	8	2785	22.2	1257	873	208	177	102	168	653	198	59	84	2	996	75	29	1139	1019	4	2162	1596	513	53	17.2

NEW HAVEN COUNTY.

TOWNS.	Population in 1880.	BIRTHS. Sex. Male.	Female.	Not stated.	Total.	Birth-rate per 1,000.	Parentage. Both American.	Both Foreign.	Amer. Mother. For. Father.	Amer. Father. For. Mother.	Both For. of differ Nations.	Not stated.	MARRIAGES. Both American.	Both Foreign.	Hus. American. Wife Foreign.	Hus. Foreign. Wife American.	Not stated.	Total.	Hus. non-resident.	Both non-resident.	DEATHS. Sex. Male.	Female.	Not stated.	Total.	Nativity. American.	Foreign.	Not stated.	Death-rate per 1,000.
New Haven,.........	62,882	877	862	3	1742	27.7	538	598	102	138	104	262	255	227	28	29	24	563	43	6	577	604	..	1181	855	308	18	18.7
Beacon Falls,.........	379	7	2	..	9	23.8	2	2	1	3	1	...	1	...	...	...	..	1	...	...	8	3	..	11	11	...	..	29.
Bethany,.............	637	8	2	1	11	17.2	8	1	...	2	...	...	5	...	...	...	..	5	...	...	8	1	1	10	10	...	.	15.7
Branford,............	3,047	30	32	..	62	20.3	23	29	7	3	...	...	6	...	...	3	..	9	...	1	24	17	..	41	38	3	..	13.4
Cheshire,............	2,284	29	24	..	53	23.2	36	12	4	1	...	...	9	1	...	1	..	11	1	...	17	17	..	34	26	8	..	14.8
Derby,..............	11,649	167	158	..	325	27.8	121	142	34	15	12	1	43	21	12	10	5	91	3	...	92	101	2	195	154	38	3	16.7
East Haven,..........	3,067	17	18	..	35	11.4	22	4	3	3	3	...	15	2	1	1	..	19	1	...	13	8	..	21	19	2	..	6.8
Guilford,............	2,782	24	21	..	45	16.1	31	11	...	3	...	...	16	1	...	1	..	18	1	...	16	19	..	35	33	1	1	12.6
Hamden,.............	3,408	17	18	..	35	10.2	25	7	2	1	...	...	15	4	...	2	..	21	1	...	14	14	..	28	20	8	..	8.2
Madison,.............	1,669	7	12	..	19	11.3	17	2	...	...	...	...	7	...	...	...	..	7	...	...	14	13	..	27	26	1	..	16.1
Meriden,.............	18,340	267	231	..	498	27.1	186	218	45	25	10	14	73	36	12	20	..	141	7	2	138	108	6	252	177	62	13	13.7
Middlebury,..........	687	7	1	..	8	11.6	7	1	...	...	...	...	8	...	...	1	..	9	...	...	8	8	..	16	13	3	..	23.2
Milford,.............	3,347	22	25	..	47	14.	38	7	2	...	...	...	21	...	...	1	..	22	3	2	22	15	..	37	35	2	.	11.
Naugatuck,...........	4,272	47	44	2	93	21.7	17	76	...	...	...	...	5	14	3	...	..	22	...	1	34	36	8	78	59	19	..	18.2
North Branford,.......	1,025	4	8	..	12	11.6	12	...	...	...	...	...	5	...	...	1	..	6	...	...	5	6	..	11	10	1	..	10.7
North Haven,.........	1,763	10	6	..	16	9.	10	5	...	1	...	...	5	...	...	...	..	5	...	...	8	2	1	11	10	1	..	6.2
Orange,..............	3,341	33	20	..	53	15.8	34	10	2	4	3	...	18	2	2	1	..	23	3	...	28	16	1	45	39	5	1	13.4
Oxford,..............	1,120	8	12	..	20	17.8	19	1	...	...	...	...	6	...	1	...	..	7	...	...	8	6	..	14	14	...	..	12.5
Prospect,............	492	2	3	..	5	10.1	5	...	...	...	...	...	4	...	...	...	..	4	1	1	6	1	..	7	7	...	..	14.2
Seymour,.............	2,318	26	23	..	49	21.1	22	16	1	9	1	...	8	2	...	1	..	11	...	...	21	14	2	37	35	2	..	15.9
Southbury,...........	1,740	19	10	..	29	16.6	21	7	...	1	...	...	5	...	...	...	..	5	...	...	11	13	..	24	20	4	..	13.7
Wallingford,..........	4,686	60	49	4	113	24.1	43	50	12	4	4	...	27	2	2	6	..	37	5	...	28	27	..	55	41	9	5	11.7
Waterbury,...........	20,269	291	259	2	552	26.1	214	216	58	39	25	...	109	33	15	25	..	182	9	1	199	196	8	403	289	114	..	19.8
Wolcott,.............	493	9	6	..	15	30.4	13	...	...	...	...	2	2	...	...	...	..	2	...	...	4	1	..	5	4	1	..	10.1
Woodbridge,..........	829	7	2	..	9	10.8	7	1	1	...	...	...	6	...	...	...	.	6	...	...	4	7	1	12	11	1	..	14.4
Total,............	156,526	1995	1848	12	3855	24.6	1469	1408	293	243	163	279	674	345	76	103	29	1227	78	14	1307	1253	30	2590	1956	593	41	16.5

NEW LONDON COUNTY.

TOWNS.	Population in 1880.	BIRTHS.										MARRIAGES.								DEATHS.							
		Sex.					Parentage.													Sex.				Nativity.			
		Male.	Female.	Not stated.	Total.	Birth-rate per 1,000.	Both Amer.	Both Foreign.	Am. Mother For. Father	Am. Father. For. Mother.	Both For. of diff. Nations.	Not stated.	Both American.	Both Foreign.	Hus. American. Wife Foreign.	Hus. Foreign. Wife American.	Not stated.	Total.	Hus. non-resident.	Both non-resident.	Male.	Female.	Not stated.	Total.	American.	Foreign.	Not stated	Death-rate per 1,000.
New London,.....	10,529	129	130	..	259	24.5	141	78	25	15	....	..	82	15	6	11	..	114	21	6	139	142	1	282	232	43	7	26.7
Norwich,..........	21,141	257	238	..	495	23.4	190	194	66	45	....	..	126	34	22	16	..	198	...	...	213	209	..	422	268	152	2	19.9
Bozrah,..........	1,155	8	9	..	17	14.7	11	4	1	1	....	..	3	2	....	....	..	5	...	...	8	7	1	16	10	6	..	13.8
Colchester,........	2,974	22	39	..	61	20.5	30	19	9	2	1	..	33	2	....	3	..	38	2	...	26	28	1	55	41	14	..	18.5
East Lyme,........	1,731	18	14	..	32	18.5	24	6	1	1	....	..	3	1	....	....	..	4	...	...	14	15	.	29	24	5	..	16.7
Franklin,..........	686	7	2	..	9	13.1	7	2	....	....	....	..	2	1	....	....	..	3	...	...	6	6	2	14	10	4	..	20.4
Griswold,..........	2,745	40	37	..	77	28.	37	31	4	3	....	2	11	22	5	....	.	38	2	...	27	21	..	48	34	14	..	17.4
Groton,............	5,127	38	51	1	90	14.5	79	8	2	1	....	..	20	1	....	3	..	24	2	...	45	56	2	103	83	20	..	20.
Lebanon,..........	1,845	21	16	..	37	20.	27	6	2	2	....	.	12	...	....	....	..	12	...	...	1	15	..	16	11	3	2	8.5
Ledyard,..........	1,373	12	18	..	30	21.9	29	....	1	....	....		14	...	....	....	..	14	2	...	9	11	..	20	18	1	1	14 5
Lisbon,...........	630	7	5	..	12	19.4	7	3	1	1	....	.	...	...	....	....	..	....	...	...	1	3	1	5	5	....	..	7 9
Lyme,............	1,025	11	13	..	24	23.3	20	...	3	1	...	..	10	...	....	....	..	10	2	...	6	8	..	14	14	....	..	13.6
Montville,.........	2,666	34	17	..	51	19.1	30	14	3	1	3	..	16	1	....	....	..	17	...	...	30	28	..	58	48	4	6	21.7
North Stonington,..	1,769	13	19	1	33	18.6	33	....	....	....	....	.	3	...	....	....	..	3	...	1	13	18	..	31	19	12	..	17.5
Old Lyme,.........	1,387	17	14	1	32	22.3	27	...	....	....	5	..	10	1	....	....	..	11	2	...	17	23	..	40	35	5	..	28.8
Preston,..........	2,519	13	10	..	23	9.1	18	1	1	3	....	..	6	...	....	....	..	6	...	...	9	15	..	24	21	3	..	9.5
Salem,............	574	3	3	..	6	10.4	5	....	....	1	....	.	7	...	....	....	..	7	...	...	2	4	..	6	6	....	..	10.4
Sprague,..........	3,207	59	54	..	113	35.2	12	91	4	5	1	..	8	15	2	7	..	32	...	...	19	25	.	44	27	18	..	13.7
Stonington,........	7,353	79	58	..	137	18.6	75	44	9	8	1	.	33	13	4	12	..	62	18	10	59	60	..	119	71	47	1	16.1
Waterford,........	2.701	15	15	..	30	11.1	27	3	....	....	....	..	18	...	....	....	..	18	...	...	22	23	..	45	40	5	.	16 6
Total,.........	73,137	803	762	3	1568	21.4	829	504	132	90	11	2	417	108	39	52	..	616	51	17	666	717	8	1391	1017	355	19	19.1

FAIRFIELD COUNTY.

TOWNS.	Population in 1880.	BIRTHS.											MARRIAGES.								DEATHS.							
		Sex.					Parentage.														Sex.				Nativity.			
		Male.	Female.	Not stated.	Total.	Birth-rate per 1,000.	Both Amer.	Both Foreign.	Am. Mother. For. Father.	Am. Father. For. Mother.	Both For. of diff. Nations.	Not stated.	Both American.	Both Foreign.	Hus. American. Wife Foreign.	Hus. Foreign. Wife American.	Not stated.	Total.	Hus. non-resident.	Both non-resident	Male.	Female.	Not stated.	Total.	American.	Foreign.	Not stated.	Death-rate per 1,000.
Danbury,	11,669	142	132	6	280	23.9	172	97	8	3	....	..	50	15	6	4	2	77	3	...	81	97	12	190	149	41	..	16.2
Bridgeport,	29,148	424	403	2	829	28.4	405	331	51	38	....	4	192	58	16	26	..	292	22	4	306	261	1	568	426	123	19	19.4
Bethel,	2,726	40	29	..	69	25.2	50	19	....	....	....	..	11	...	....	....	..	11	1	...	32	27	..	59	53	6	..	21.6
Brookfield,	1,152	9	12	..	21	18.2	12	9	....	....	....	..	3	...	....	....	1	4	...	...	13	8	..	21	19	2	..	18.2
Darien,	1,948	19	18	..	37	18.9	27	8	1	1	....	..	5	...	....	....	..	5	...	...	15	21	..	36	34	2	..	18.4
Easton	1,145	7	6	..	13	11.3	11	2	....	....	....	..	5	...	....	....	..	5	...	...	7	6	..	13	12	1	..	11.3
Fairfield,	3,748	38	25	2	65	17.2	30	25	4	6	....	..	13	2	1	1	3	20	1	2	33	24	3	60	54	6	..	16.
Greenwich,	7,892	49	46	1	96	12.1	62	28	4	2	....	..	20	4	2	2	..	28	3	...	32	49	..	81	68	12	1	10.2
Huntington,	2,499	33	28	..	61	24.4	39	13	3	6	....	..	7	1	....	....	..	8	...	...	23	24	..	47	43	4	..	18.8
Monroe,	1,157	5	5	..	10	8.6	7	1	1	1	....	..	6	1	....	1	..	8	1	...	8	5	..	13	12	1	..	11.2
New Canaan,	2,673	31	13	..	44	16.4	35	7	1	1	....	..	16	1	....	....	..	17	4	1	24	21	..	45	43	2	..	16.8
New Fairfield,	791	5	3	1	9	11.3	9	....	....	....	....	..	1	...	....	....	..	1	...	...	12	6	2	20	20	....	..	25.2
Newtown,	4,013	34	42	..	76	18.9	40	32	....	4	....	..	15	2	1	1	..	19	...	...	34	35	1	70	58	12	..	17.4
Norwalk,	13,956	130	110	1	241	17.2	167	74	....	....	....	.	67	7	3	9	..	86	17	3	129	90	7	226	204	22	..	16.2
Redding,	1,540	19	5	.	24	15.5	14	8	1	1	....	..		...	....	....	..	4	...	...	14	9	..	23	22	1	..	14.8
Ridgefield,	2,028	19	14	..	33	16.1	33	....	....	...	....	..	12	...	....	....	..	12	...	...	18	16	..	34	33	1	..	16.7
Sherman,	828	3	5	2	10	12.	8	2	....	....	....	..	2	...	....	...	..	2	...	...	9	10	..	19	19	....	..	22.8
Stamford,	11,298	130	123	..	253	22.3	108	114	22	9	....	..	27	19	4	4	..	54	4	...	81	89	..	170	138	30	2	14.9
Stratford,	4,251	21	15	..	36	8.4	25	7	2	2	....	..	12	1	....	2	..	15	1	...	13	12	..	25	....	....	25	5.8
Trumbull,	1,323	13	6	..	19	14.1	13	2	3	1	....	..	7	...	....	1	..	8	1	...	15	6	..	21	21	....	..	15.8
Weston,	918	10	8	..	18	19 6	15	3	....	....	....	..	4	...	....	....	..	4	...	...	4	7	..	11	11	....	..	11 8
Westport,	3,477	40	23	..	63	18.2	38	22	1	2	...	..	11	1	1	....	..	13	...	...	32	32	..	64	57	7	..	18.5
Wilton,	1,864	13	17	..	30	16.	25	5	....	....	....	..	6	...	....	1	..	7	1	...	18	20	..	38	38	....	..	20.3
Total,	112,044	1234	1088	15	2337	20.8	1345	809	102	77	....	4	496	112	34	52	6	700	59	10	953	875	26	1854	1534	273	47	16.5

WINDHAM COUNTY.

TOWNS.	Population in 1880.	BIRTHS. Sex. Male.	Female.	Not stated.	TOTAL.	Birth-rate per 1,000.	Parentage. Both Amer.	Both Foreign.	Am. Mother. For. Father.	Am. Father. For. Mother.	Both For. of diff Nations.	Not stated.	MARRIAGES. Both American.	Both Foreign.	Hus. American. Wife Foreign.	Hus. Foreign. Wife American.	Not stated.	TOTAL.	Hus. non-resident.	Both non-resident.	DEATHS. Sex. Male.	Female.	Not stated.	TOTAL.	Nativity. American.	Foreign.	Not stated.	Death-rate per 1,000.
BROOKLYN, ...	2,308	32	31	..	63	27.2	19	36	4	3	....	1	6	...	....	1	..	7	1	...	13	25	.	38	22	16	..	16 4
Ashford, ...	1,041	8	5	..	13	12.4	11	....	1	1	....	..	6	...	....	1	..	7	1	...	8	3	..	11	11	....	..	10.5
Canterbury, ...	1,272	7	7	..	14	11.	9	3	2	....	....	..	3	...	2	....	..	5	1	...	9	13	..	22	21	1	..	17.2
Chaplin, ...	627	10	8	..	18	28.7	16	....	1	1	....	..	1	...	....	....	..	1	1	...	4	4	..	8	7	1	..	25.5
Eastford, ...	855	7	5	..	12	12.8	11	1	....	....	....	..	4	...	....	....	2	6	2	...	3	6	..	9	9	....	..	10.5
Hampton, ...	827	10	8	..	18	21.7	12	4	1	1	....	..	2	1	....	....	..	3	...	...	7	6	..	13	....	...	13	15.7
Killingly, ...	6,921	98	86	1	185	26.7	75	94	8	7	....	1	26	21	3	10	..	60	2	1	66	66	1	133	82	42	9	19.2
Plainfield, ...	4,021	41	39	1	81	20.3	25	47	4	5	....	..	12	7	1	3	..	23	3	...	36	37	..	73	44	27	2	18.1
Pomfret, ...	1,470	15	21	1	37	25.1	30	4	1	....	....	2	6	...	....	....	.	6	...	...	12	16	..	28	22	6	..	19.
Putnam, ...	5,827	111	117	..	228	39.1	53	154	10	6	5	..	51	18	5	10	..	84	15	3	61	62	..	123	81	38	4	21.1
Scotland, ...	590	4	9	.	13	22.	11	2	....	...	....	..	4	...	....	....	..	4	...	...	3	9	..	12	10	2	..	20.3
Sterling, ...	957	3	5	..	8	8.3	6	2	...	....	....	..	6	...	....	....	..	6	...	1	4	4	..	8	....	....	8	8.3
Thompson, ...	5,051	75	6	4	146	29.1	20	98	16	10	2	..	16	44	1	...	..	61	8	5	66	52	..	118	79	39	..	23.3
Voluntown, ...	1,186	23	26	..	49	41.3	31	15	1	2	....	..	3	...	....	1	..	4	...	...	10	11	..	21	13	8	..	17.9
Windham, ...	8,265	111	94	1	206	24.9	83	95	17	11	....	..	55	12	3	6	1	78	11	...	102	68	..	170	101	61	8	20.5
Woodstock, ...	2,639	14	10	..	24	9.	18	5	...	1	...	..	15	...	....	....	.	15	6	4	8	17	..	25	16	7	2	9.4
Total, ...	43,857	569	538	8	1115	25.4	430	560	66	48	7	4	216	104	15	32	3	370	51	14	412	399	1	812	518	248	46	18.5

LITCHFIELD COUNTY.

TOWNS.	Population in 1880.	BIRTHS.											MARRIAGES.								DEATHS.							
		Sex.					Parentage.														Sex.				Nativity.			
		Male.	Female.	Not stated.	Total.	Birth-rate per 1,000.	Both Amer.	Both Foreign.	Am. Mother. For. Father.	Am. Father. For. Mother.	Both For. of diff. Nations.	Not stated.	Both American.	Both Foreign.	Hus. American. Wife Foreign.	Hus. Foreign. Wife American.	Not stated.	Total.	Hus. non-resident.	Both non-resident.	Male.	Female.	Not stated.	Total.	American.	Foreign.	Not stated.	Death-rate per 1,000.
Litchfield,	3,410	31	25	..	56	16.3	34	19	3	....	..	..	24	3	3	..	..	30	2	2	20	22	..	42	30	8	4	12.3
Barkhamstead,	1,298	6	5	..	11	8.4	11	....	....	....	....	..	7	...	....	..	..	7	...	...	7	4	..	11	9	2	..	8.4
Bethlehem,	655	5	1	..	6	9.1	4	1	1	...		..	2	...	....	..	..	2	...	...	5	5	..	10	9	1	..	15.2
Bridgewater,	708	6	5	..	11	15.5	9	2	....	....	....	..	4	...	1	....	..	5	1	...	5	8	..	13	11	2	..	18.3
Canaan,	1,157	8	4	..	12	10.3	11	1	....	....	....	..	7	...	....	....	..	7	..	...	3	8	..	11	...	....	11	9.5
Colebrook,	1,148	4	6	..	10	8.7	6	4	....	....	....	..	7	1	....	....	..	8	...	1	2	2	..	4	4	....	..	3.4
Cornwall,	1,583	15	13	..	28	17.6	20	5	3	....	....	..	6	2	....	....	..	8	2	...	9	8	..	17	15	2	..	10.7
Goshen,	1,093	8	3	..	11	10.	9	2	....	....	....	..	4	...	1	....	..	5	1	...	5	5	..	10	9	1	..	9.1
Harwinton,	1,016	15	7	..	22	21.6	16	3	2	1	....	..	4	...	....	....	..	4	...	...	6	7	..	13	13	....	..	12.4
Kent,	1,622	17	14	..	31	19.1	28	2	1	....	....	..	8	...	....	....	.	8	...	...	12	10	..	22	19	3	..	13.5
Morris,	627	4	3	..	7	11.1	7	....	....	....	....	.	2	1	....	....	..	3	...	...	4	3	..	7	6	1	..	11.1
New Hartford,	3,302	28	44	..	72	21.8	30	27	11	3	1	..	11	6	2	2	..	21	...	...	15	17	..	32	21	10	1	9.7
New Milford,	3,907	30	32	1	63	16.1	40	5	2	1	15	..	31	1	1	2	..	35	4	...	36	42	..	78	56	8	14	19.7
Norfolk,	1,418	11	11	..	22	15.5	13	7	1	1	....	..	5	...	....	1	..	6	3	...	'5	4	..	9	5	4	..	6.3
North Canaan,	1,537	15	12	..	27	17.5	16	10	....	1	....	..	4	1	....	....	..	5	...	...	13	67	..	30	23	7	..	18.8
Plymouth,	2,350	23	26	..	49	20.8	31	13	3	1	1	..	9	6	1	1	..	17	...	...	23	6	..	29	22	7	..	12.3
Roxbury,	950	5	8	..	13	13.6	8	3	2	....	....	..	4	...	....	....	..	4	1	...	8	6	..	14	13	1	..	14.7
Salisbury,	3,715	46	33	..	79	21.2	54	17	5	2	1	..	19	2	1	1	..	23	6	2	28	32	..	60	47	12	1	16.1
Sharon,	2 580	29	24	..	53	20.5	43	4	4	2	..	..	4	1	....	1	..	6	1	...	15	19	3	37	27	10	..	14.3
Thomaston,	3,225	59	48	..	107	33.1	43	44	8	5	2	5	31	11	3	1	..	46	1	2	18	15	..	33	20	12	1	10.2
Torrington,	3,327	40	45	.	85	25.5	49	26	5	5	....	..	17	5	2	2	..	26	2	...	20	26	..	46	31	14	1	13.8
Warren,	639	6	11	..	17	26.6	14	3	....	....	....	..	4	1	....	....	..	5	...	...	2	4	..	6	5	1	..	9.3
Washington,	1,589	17	13	..	30	18.8	23	5	2	....	....	..	10	1	1	....	..	12	...	...	8	5	..	13	11	2	..	8.1
Watertown,	1,897	20	24	..	44	23.2	36	3	3	2	....	..	13	1	1	....	..	15	1	...	14	21	1	36	29	4	3	18.9
Winchester,	5,142	59	59	..	118	22.9	47	52	8	11	....	..	22	27	....	....	..	49	3	2	35	34	..	69	37	32	..	13.4
Woodbury,	2,148	27	12	1	40	18 6	27	13	....	....	....	..	15	...	....	....	..	15	...	...	24	16	..	40	38	2	..	18.6
Total,	52,043	534	488	2	1024	19.6	629	271	64	35	20	5	274	70	17	11	.	372	28	9	342	346	4	692	509	147	36	

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MIDDLESEX COUNTY.

TOWNS.	Population in 1880.	BIRTHS. Sex. Male.	Female.	Not stated.	TOTAL.	Birth-rate per 1,000.	Parentage. Both Amer.	Both Foreign.	Am. Mother. For. Father.	Am. Father. For. Mother.	Both For. of diff. Nations.	Not stated.	MARRIAGES. Both American.	Both Foreign.	Hus. American. Wife Foreign.	Hus. Foreign. Wife American.	Not stated.	TOTAL.	Hus. non-resident.	Both non-resident.	DEATHS. Sex. Male.	Female.	Not stated.	TOTAL.	Nativity. American.	Foreign.	Not stated.	Death-rate per 1,000.
MIDDLETOWN, ...	11,731	142	102	..	244	20.7	115	56	33	19	7	14	58	10	8	12	2	90	8	2	100	102	1	203	139	58	6	17.3
Haddam,..........	2,419	20	12	..	32	13.2	21	6	3	....	2	..	6	...	....	....	..	6	...	...	14	12	.	26	24	2	..	10.7
Chatham,..........	1,967	19	17	..	36	18.8	25	9	1	1	....	..	13	2	....	....	..	15	1	...	9	10	..	19	18	....	1	9.6
Chester,..........	1,177	9	5	..	14	11.8	9	3	2	....	...	..	4	1	....	....	..	5	...	...	3	4	..	7	7	....	..	5.9
Clinton,..........	1,402	10	8	..	18	12.8	13	1	1	1	2	..	21	...	....	....	..	21	1	...	10	14	..	24	18	1	5	19.9
Cromwell,..........	1,640	8	13	..	21	12.8	13	8	....	....	....	..	7	1	1	1	..	10	...	...	9	9	..	18	14	4	..	10.9
Durham,..........	990	6	12	..	18	18.1	14	2	....	2	....	..	8	..	....	....	..	8	1	...	5	9	..	14	9	4	1	14.1
East Haddam,.....	3,032	28	26	..	54	17.8	49	5	....	....	....	..	17	...	....	....	..	17	...	...	21	28	..	49	42	7	..	16.1
Essex,..........	1,855	13	12	..	25	13.4	21	2	....	1	....	1	10	...	....	....	..	10	1	...	12	12	..	24	21	3	..	12.4
Killingworth,......	748	3	5	..	8	10.7	7	....	....	1	....	..	7	...	....	....	..	7	...	...	3	11	..	14	14	....	..	18.8
Middlefield,........	928	7	6	..	13	14.	10	1	....	2	....	..	6	...	....	....	..	6	2	...	7	2	..	9	6	3	..	9.7
Old Saybrook,.....	1,302	18	14	..	32	24.5	19	5	1	6	1	..	7	1	....	....	..	8	...	...	8	17	..	25	20	5	..	19.2
Portland,..........	4,156	65	48	..	113	27.1	21	81	7	1	3	..	16	30	2	....	3	51	...	1	41	39	..	80	58	21	1	19.4
Saybrook,..........	1,362	13	13	..	26	18.9	21	1	2	1	1	.	...	...	....	5	..	5	...	...	6	10	..	16	14	2	..	11.7
Westbrook, ...	878	9	6	..	15	17.4	15	..	....	....	....	..	3	...	....	....	..	3	...	...	10	2	..	12	12	....	..	13.6
Total,........	35,587	370	299	..	669	18.8	373	180	50	35	16	15	183	45	11	18	5	262	14	3	258	281	1	540	416	110	14	15.1

TOLLAND COUNTY.

TOWNS.	Population in 1880.	BIRTHS. Sex. Male.	Female.	Not stated.	TOTAL.	Birth-rate per 1,000.	Parentage. Both Amer.	Both Foreign.	Am. Mother. For. Father.	Am. Father. For. Mother.	Both For. of diff. Nations.	Not stated.	MARRIAGES. Both American.	Both Foreign.	Hus. American. Wife Foreign.	Hus. Foreign. Wife American.	Not stated.	TOTAL.	Hus. non-resident.	Both non-resident.	DEATHS. Sex. Male.	Female.	Not stated.	TOTAL.	Nativity. American.	Foreign.	Not stated.	Death-rate per 1,000.
TOLLAND,	1,169	10	6	..	16	13.6	11	2	....	....	....	3	3	...	....	1	..	4	...	...	8	4	..	12	9	2	1	10.2
Andover,	428	2	4	..	6	14.	5	1	...	....	....	..	5	...	....	.....	..	5	..	...	3	10	..	13	11	....	2	30.3
Bolton,	512	4	3	..	7	13.6	7	....	....	....	....	..	6	...	....	1	..	7	...	...	3	6	..	9	7	2	..	17.5
Columbia,	757	5	3	..	8	10.5	8	....	....	....	....	..	5	...	....	.....	..	5	...	1	3	8	..	11	5	6	..	14.5
Coventry,	2,043	19	27	..	46	22.5	27	15	1	1	2	..	9	...	....	.....	..	9	2	...	16	17	..	33	24	6	3	16.1
Ellington,	1,569	12	9	..	21	13.3	10	9	2	....	....	..	4	2	....	.....	..	6	...	1	6	4	..	10	8	2	..	6.3
Hebron,	1,243	9	8	..	17	13.6	10	5	1	1	....	..	7	1	....	.....	..	8	...	1	7	6	..	13	10	2	..	10.4
Mansfield,	2,154	21	10	..	31	14.3	29	1	1	....	....	..	10	...	....	.....	..	10	...	2	15	13	..	28	24	3	1	13.
Somers,	1,242	8	7	..	15	12.	13	1	1	....	....	..	5	...	....	1	..	6	...	...	6	9	..	15	10	5	..	12.
Stafford,	4,455	48	48	3	99	22.	55	39	3	2	....	..	39	12	....	7	3	61	...	14	24	29	4	57	27	27	3	10.5
Union,	53	5	7	..	12	22.2	9	....	3	....	....	..	4	...	....	.....	..	4	...	2	7	7	..	14	....	....	14	26.
Vernon,	6,915	92	81	..	173	25.	50	97	14	5	....	7	39	15	7	9	.	70	...	5	75	48	..	123	82	38	3	17.7
Willington,	1,08	11	14	..	25	23.	19	5	1	....	....	..	6	...	....	1	..	7	...	1	15	14	..	29	24	3	2	26.7
Total,	24,122	246	227	3	476	19.7	253	175	27	9	2	10	142	30	7	20	3	202	2	27	188	175	4	367	241	96	30	15.2

RECAPITULATION BY COUNTIES.

COUNTIES.	Population in 1880.	BIRTHS.											MARRIAGES.								DEATHS.							
		Sex.					Parentage.						Nativity.								Sex.				Nativity.			
		Male.	Female.	Not stated.	Total.	Birth-rate per 1,000.	Both Amer.	Both Foreign	Am. Mother For. Father.	Am. Father For. Mather.	Both For. of diff. Nations.	Not stated.	Both Amer'n.	Both Foreign.	Hus. Amer'n. Wife Foreign.	Hus. Foreign. Wife Amer'n.	Not stated.	Total.	Hus. non-resident.	Both non-resident.	Male.	Female.	Not stated.	Total.	American.	Foreign.	Not stated.	Death-rate per 1,000.
Hartford, ...	125,387	1524	1253	8	2785	22.2	1257	873	208	177	102	168	653	198	59	84	2	996	75	29	1129	1007	26	2162	1596	513	53	17.2
New Haven,..	156,526	1995	1848	12	3855	24.6	1469	1408	293	243	163	279	674	345	76	103	29	1227	78	14	1307	1253	30	2590	1956	593	41	16.5
New London,	73,137	803	762	3	1568	21.4	829	504	132	90	11	2	417	108	39	52	..	616	51	17	666	717	8	1391	1017	355	19	19.1
Fairfield,.....	112,044	1234	1088	15	2337	20.8	1345	809	102	77	....	4	496	112	34	52	6	700	59	10	953	875	26	1854	1534	273	47	16.5
Windham,....	43,857	569	538	8	1115	25.4	430	560	66	48	7	4	216	104	15	32	3	370	51	14	412	399	1	812	518	248	46	18.5
Litchfield,....	52,043	534	488	2	1024	19.6	629	271	64	35	20	5	274	70	17	11	..	372	28	9	342	346	4	692	509	147	36	13.2
Middlesex,....	35,587	370	299	..	669	18.8	373	180	50	35	16	15	183	45	11	18	5	262	14	3	258	281	1	40	416	110	14	15.1
Tolland,.....	24,112	246	227	3	476	19.7	253	175	27	9	2	10	142	30	7	20	3	202	2	27	188	175	4	367	241	96	30	15.2
Total, ..	622,693	7275	6503	51	13829	22.2	6585	4780	942	714	321	487	3055	1012	258	372	48	4745	358	123	5255	5053	100	10408	7787	2335	286	16.7

TABLE 2.

EXHIBITING THE NUMBER OF BIRTHS IN THE SEVERAL COUNTIES FOR EACH MONTH IN THE YEAR ENDING DECEMBER 31, 1880.

County.	Sex.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
	Males, ...	124	140	147	102	111	120	109	138	145	144	120	124	1,524
Hartford,....	Females,...	98	112	108	105	104	102	108	95	110	116	96	99	1,253
	Not stated,	1	1	....	1	2	...	1	1	....	1	....	....	8
	Males, ...	164	162	152	158	137	167	157	197	183	188	150	180	1,995
New Haven,.	Females,...	163	118	137	159	153	162	140	178	165	161	148	164	1,848
	Not stated,	2	....	2	1	1	....	2	....	1	2	....	1	12
	Males, ...	58	77	68	72	63	60	66	72	65	65	67	70	803
New London,	Females,...	74	50	60	71	67	70	51	65	72	59	57	66	762
	Not stated,	....	....	....	....	....	1	....	....	....	....	2	...	3
	Males, ...	109	106	102	108	103	95	95	101	98	114	107	96	1,234
Fairfield,....	Females,...	89	102	94	88	87	86	85	97	80	104	77	99	1,088
	Not stated,	1	1	2	1	2	2	1	1	2	....	....	2	15
	Males, ...	53	45	48	54	61	47	40	50	43	36	45	46	568
Windham, ..	Females,...	48	46	49	39	52	46	44	40	50	49	36	38	537
	Not stated,	1	....	...	....	....	....	1	1	1	2	1	3	10
	Males,.....	41	56	39	44	38	47	42	42	54	45	39	47	534
Litchfield,...	Females,...	44	43	41	32	45	43	36	36	44	48	40	36	488
	Not stated,	...	....	....	....	....	....	....	1	....	....	1	....	2
	Males, ...	33	19	28	28	28	30	30	34	53	29	27	31	370
Middlesex, ..	Females,...	14	30	28	28	20	29	24	22	26	34	25	19	299
	Not stated,	....	....	...	....	....	....	....	....	....	....	....	....	....
	Males, ...	20	24	19	21	17	20	22	25	22	20	15	21	246
Tolland, ...	Females,...	26	17	17	20	25	15	18	12	15	21	20	21	227
	Not stated,	1	....	....	1	1	....	....	....	....	....	....	....	3
	Males, ...	602	629	603	587	558	586	561	659	663	641	570	615	7,274
Total,..	Females,...	556	518	534	542	553	553	506	545	562	592	499	542	6,502
	Not stated,	6	2	4	4	6	3	5	4	4	5	4	6	53
Grand Total,....		1164	1149	1141	1133	1117	1142	1072	1208	1229	1238	1073	1163	13,829

TABLE 3.

EXHIBITING THE NUMBER OF DEATHS IN THE SEVERAL COUNTIES FOR EACH MONTH IN THE YEAR ENDING DECEMBER 30, 1880.

COUNTY.	SEX.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	TOTAL.
Hartford,....	Males,....	88	72	88	126	77	92	168	87	92	84	77	88	1,139
	Females,...	66	58	97	85	81	80	115	97	92	86	70	92	1,019
	Not stated,	....	....	2	....	....	1	1	....	....	....	....	....	4
New Haven,.	Males,....	85	110	111	103	116	106	146	131	97	73	104	125	1,307
	Females,...	95	112	114	128	103	88	156	99	94	78	93	95	1,255
	Not stated,	5	....	1	2	2	1	3	3	4	5	1	1	28
New London,	Males,....	51	56	50	40	49	50	56	69	69	60	51	65	666
	Females,...	46	47	72	61	67	52	44	66	64	75	55	68	717
	Not stated,	2	1	....	1	1	1	....	1	....	....	1	....	8
Fairfield,....	Males,....	70	68	98	77	69	61	96	87	77	83	60	107	953
	Females,...	77	75	81	82	66	53	114	83	57	63	73	61	875
	Not stated,	1	2	2	1	1	3	3	6	....	1	2	4	26
Windham,...	Males,....	23	27	35	30	37	22	54	50	36	26	29	39	408
	Females,...	26	32	30	27	38	31	48	46	34	37	28	27	404
	Not stated,	....	....	....	....	....	....	....	....	....	....	....	....	......
Litchfield,...	Males,....	26	31	29	28	31	20	28	43	28	26	25	27	342
	Females,...	27	35	41	34	25	23	31	25	29	25	21	30	346
	Not stated,	....	1	....	....	...	....	....	....	....	....	....	3	4
Middlesex,...	Males,....	18	19	23	15	20	18	25	33	21	20	15	31	258
	Females,...	21	28	26	18	21	25	28	29	24	15	22	24	281
	Not stated,	....	....	....	....	....	....	....	....	....	....	....	1	1
Tolland, ...	Males,....	13	9	16	11	10	10	19	25	17	14	26	18	188
	Females,...	9	11	21	9	10	14	23	14	15	18	19	12	175
	Not stated,	....	1	.. .	....	1	....	....	....	....	1	....	1	4
Total,...	Males,....	374	392	450	430	409	379	592	525	437	386	387	500	5,261
	Females,...	367	398	482	444	411	356	559	459	409	397	381	409	5,072
	Not stated,	8	5	5	4	5	6	7	10	4	7	4	10	75
Grand Total,....		749	795	937	878	825	741	1158	994	850	790	772	919	10,408

TABLE 4.

CAUSES OF DEATHS ARRANGED BY TOWNS AND COUNTIES.

CLASS I.—ZYMOTIC DISEASES.

Towns in Hartford Co.	Order I.—Miasmatic. Small-pox.	Measles.	Scarlet Fever.	Diphtheria.	Croup.	Whooping Cough.	Typhoid Fever.	Erysipelas.	Puerperal Fever.	Carbuncle.	Dysentery.	Diarrhea.	Cholera Infantum.	Malarial Fever.	Intermittent Fever.	Congestive Fever.	Remittent Fever.	Typho-Malarial Fever.	Rheumatism.	Cerebro-Spinal Meningitis.	Total. M.	Total. F.	Order II.—Enthetic. Syphilis.	Ex. Ophthalmic Goitre.	Septicaemia.	Worms.	Hydrophobia.	Total. M	Total. F.	Order III.—Dietic. Purpura and Scurvy.	Privation and Neglect.	Alcholism.	Total. M.	Total. F.	Total for Class I. Male.	Female.	Total.
Hartford,	1	5	3	17	11	4	13	4			3	14	74	23	1			2	8	3	101	85	6					1	5			9	7	2	109	92	201
Avon,																		1				1														1	1
Berlin,													4								1	3		1					1						1	4	5
Bloomfield,								1			1		2							1	3	2													3	2	5
Bristol,			1	3	7	2	4	2					4			2		1		3	16	13													16	13	29
Burlington,			1		3																1	3													1	3	4
Canton,				4	1				1				5					5		3	11	8													11	8	19
East Granby,																																					
East Hartford,				3	1				2			5	8	4			1				11	13													11	13	24
East Windsor,				6	3		1				2	1	2					1			7	9	1					1							8	9	17
Enfield,		2	5	3	8	1	4		1		1	2	11		1			1	1		22	19										1	1		23	19	42
Farmington,													6					3			6	3													6	3	9
Glastonbury,				3		1	1	1	2						1						2	7													2	7	9
Granby,				2		1											1			1	2	3													2	3	5
Hartland,																																					
Manchester,					2	1	5					1	5			1		12			11	16				1		1							12	16	28
Marlborough,							2														2														2		2
New Britain,		1		6	5	2	1		3		2	2	27			1	3	6	1		38	22									1		1		39	22	61
Newington,				1									6					3		1	8	3													8	3	11
Plainville,				9		5									1			1			9	7										1	1		10	7	17
Rocky Hill,				1												1					1	1													1	1	2
Simsbury,											1		2						1			4	1					1				1	1		2	4	6
Southington,			4		3		3						10		1	1		4			15	11			1				1						15	12	27
South Windsor,					1		2						3						1		5	2													5	2	7
Suffield,							2					1	2			3			1		4	5													4	5	9
West Hartford,				1																		1														1	1
Wethersfield,							1				1	2	1		2			1		1	6	3													6	3	9
Windsor,							1					1	4						1	1	3	5													3	5	8
Windsor Locks,				4					1				1	2							1	7													1	7	8
Total,	1	8	14	63	45	17	40	8	10	.	11	29	177	29	7	9	5	41	14	14	286	256	8	1	1	1	..	4	7	....	1	12	11	2	301	265	566

Towns in Hartford Co.	CLASS II.—CONSTITUTIONAL DISEASES. Order 1.—Diethetic. Dropsy and Anæmia.	Cancer.	Senile Gangrene.	Total. M.	Total. F.	Order 2.—Tubercular. Scrofula	Tabes Mesenterica.	Phthisis.	Hydrocephalus.	Total. M.	Total. F.	Total for Class II. Male.	Female.	Total.
Hartford,	4	20	3	10	17	2	6	110	3	71	50	81	67	148
Avon,	...	...	...	...	...	...	...	2	...	1	1	1	1	2
Berlin,	...	3	...	2	1	...	2	...	2	2	2	4	3	7
Bloomfield,	...	...	...	...	...	...	...	2	...	1	1	1	1	2
Bristol,	3	3	...	3	3	...	...	17	1	6	12	9	15	24
Burlington,	...	...	...	...	...	...	...	5	...	1	4	1	4	5
Canton,	...	3	...	...	3	...	...	12	1	10	3	10	6	16
East Granby,	...	...	...	...	...	...	...	2	...	1	1	1	1	2
East Hartford,	...	2	...	...	2	...	1	6	...	3	4	3	6	9
East Windsor,	...	1	...	...	1	1	1	1	...	2	1	2	2	4
Enfield,	1	2	1	3	1	...	...	14	...	6	8	9	9	18
Farmington,	1	...	...	...	1	...	...	6	...	2	4	2	5	7
Glastonbury,	1	...	...	1	...	2	1	4	...	3	4	4	4	8
Granby,	...	1	...	1	...	...	...	1	...	...	1	1	1	2
Hartland,	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Manchester,	3	4	...	2	5	1	...	21	...	9	13	11	18	29
Marlborough,	...	...	...	...	...	...	...	1	...	1	...	1	...	1
New Britain,	...	2	...	2	...	...	7	42	2	28	23	30	23	53
Newington,	1	...	...	...	1	...	...	2	...	1	1	1	2	3
Plainville,	...	1	...	...	1	...	...	2	...	1	1	1	2	3
Rocky Hill,	1	...	...	...	1	...	...	...	...	...	...	...	1	1
Simsbury	1	...	...	1	...	...	...	3	...	2	1	3	1	4
Southington,	3	1	1	4	1	1	...	11	...	5	7	9	8	17
South Windsor,	...	2	...	1	1	...	1	2	...	1	2	2	3	5
Suffield,	1	1	...	1	1	1	...	4	...	3	2	4	3	7
West Hartford,	...	...	1	1	...	...	...	2	...	1	1	2	1	3
Wethersfield,	1	...	1	2	...	...	1	4	...	3	2	5	2	7
Windsor,	...	5	...	...	5	1	...	6	...	2	5	2	10	12
Windsor Locks,	...	1	...		1	...	...	3	1	1	3	1	4	5
Total	21	52	7	34	46	9	20	285	10	167	157	201	203	404

Towns in Hartford Co.	CLASS III.—LOCAL DISEASES. Order 1.—Nervous System. Apoplexy.	Paralysis.	Insanity.	Epilepsy.	Tetanus.	Convulsions.	Meningitis.	Brain Disease.	Neuralgia.	Spinal Disease.	Total. M.	Total. F	Orders 2 and 3. Heart Disease.	Aneurism.	Pericarditis.	Capillary Bronchitis.	Pleurisy.	Lung Disease.	Bronchitis.	Pneumonia.	Laryngitis.	Asthma.	Total. M.	Total. F.
Hartford,	22	12	14	1	1	13	20	19	1	2	63	42	47	...	...	...	3	5	33	52	1	1	74	68
Avon,	...	1	...	...	...	...	...	2	...	...	1	2	...	...	...	...	...	...	...	5	...	...	3	2
Berlin,	1	5	...	...	...	2		...	...	...	5	3	2	...	1	...	...	...	2	6	...	...	8	3
Bloomfield,	...	2	...	...	...	...	...	...	1	...	1	2	...	...	...	...	...	...	...	4	...	...	3	1
Bristol,	1	4	...	1	...	4	...	...	...	...	8	2	4	...	...	...	...	...	2	1	...	...	3	4
Burlington,		1	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1	...	...	...	1
Canton,	1	1	...	...	...	1	...	...	...	...	2	1	1	...	...	...	...	...	2	1	...	...	...	4
East Granby,	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
East Hartford,	2	...	...	...	...	3	1	1	...	...	5	2	2	...	...	...	...	...	...	6	...	...	6	2
East Windsor,	2	...	...	...	...	...	...	...	...	...	2	...	5	...	...	...	...	1	...	...	...	...	2	4
Enfield,	2	7	...	...	...	1	1	4	...	1	6	10	7	...	...	...	...	6	2	7	...	2	11	13
Farmington,	3	...	...	...	...	...	...	2	...	...	3	2	1	...	...	...	...	1	1	3	...	...	...	6
Glastonbury,	2	...	1	...	...	2	...	1	...	...	4	2	1	...	...	...	...	1	...	3	...	...	4	1
Granby,	1		...	...	...	...	...	...	...		...	1	2	...	...	...	...	...	...	...	...	...	1	1
Hartland,	3	...	...	...	...	...	...	...	...	...	1	2	...	...	...	...	1	...	...	...	...	...	1	...
Manchester,	3	2	...	...	...	2	4	...		1	9	3	6	...	...	...	...	...	1	9	...	...	10	6
Marlborough,	...	1	...	...	...	1	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...
New Britain,	5	3	1	...	...	11	8	4	...	...	21	11	11	...	...	1	2	...	3	14	...	...	21	10
Newington,	...	4	...	...	1	...	...	1	...	...	3	3	1	...	...	...	...	1	1	...	...	...	2	1
Plainville,	4	...	...	...	...	...	...	...	...	...	4	...	...	...	...	...	...	...	...	1	...	...	1	...
Rocky Hill,	1	2	...	...	...	...	...	...	1	...	1	3	...	...	...	...	...	...	...	...	...	...	...	...
Simsbury	1	...	...	...	...	...	...	1	1	1	3	1	1	...	...	...	...	...	1	2	...	...	2	2
Southington,	1	4	...	...	...	3	...	1	...	...	2	7	3	1	1	1	...	...	...	10	...	1	10	7
South Windsor,	1	...	...	...	...	...	...	...	...	...	1	...	3	...	...	...	...	...	...	2	...	...	4	1
Suffield,	1	5	...	...	...	2	1	2	...	...	5	6	2	...	...	...	...	...	...	...	...	...	...	2
West Hartford,	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	2	...	...	2	2
Wethersfield,	5	1	...	1	...	1	...	1	...	...	6	3	2	...	...	...	...	...	...	3	...	...	3	2
Windsor,	...	2	...	...	...	...	...	2	...	...	2	2	2	...	...	...	...	...	...	4	...		4	2
Windsor Locks,	...	1		...	...	...	...	1	...	1	...	3	...	...	...	...	...	...	...	8	...	...	...	1
Total	62	58	16	3	2	46	35	42	4	6	161	113	105	1	2	2	6	15	48	137	1	4	175	146

CLASS III.—LOCAL DISEASES—Continued.

Towns in Hartford Co.	Order 4.—Digestive Organs.																	Order 5.—Urinary Organs.												Order 6.—Generative Organs.					Order 8.—Integumentary System.							Total for Class III.		
	Gastritis.	Enteritis.	Peritonitis.	Ascites.	Ulceration of Intestines.	Intussusception	Hernia.	Stricture Intestines.	Stomach Disease.	Colic.	Hepatitis.	Jaundice.	Liver Disease.	Fistula.	Male.	Female.	Total.	Disease of Spleen.	Bright's Disease.	Nephritis.	Diabetes.	Calculus.	Cystitis.	Kidney Disease.	Prostatitis.	Uremia.	Male.	Female.	Total.	Ovarian Tumor.	Ovarian Dropsy.	Uterine Tumer.	Disease of Uterus.	Total.	Ulcer.	Phlegmon.	Tumor.	Joint Disease.	Disease of Skin.	Male.	Female.	Males.	Females.	Total.
Hartford,	3	5	12		1	1			1		1		10		21	13	34	1	16	1	5		3	3			13	16	29						1		7		2	3	7	174	146	320
Avon,			1													1	1		1								1		1													5	5	10
Berlin,		1														1	1																									13	7	20
Bloomfield,			1													1	1																									4	4	8
Bristol,									1				1		1	1	2				1		2				2	1	3	2				2								14	10	24
Burlington,	1			1							1				1	2	3																									2	3	5
Canton,		2													1	1	2		1							1	1	1	2						1					1		5	7	12
East Granby,	1			1											1	1	2																									1	1	2
East Hartford,													1			1	1																									11	5	16
East Windsor,					1				1			1	2		2	3	5							1			1		1				3	3								7	10	17
Enfield,		2							1						3		3		2			1					2	1	3				1	1								22	25	47
Farmington,	1															1	1																									3	9	12
Glastonbury,							1		1	1			2		1	4	5																									9	7	16
Granby,													1		1		1		1								1		1													3	2	5
Hartland,	1									1						2	2																									2	4	6
Manchester,	1								1						1	1	2		4				2	3			5	4	9	1				1		2				1	1	26	16	42
Marlborough,			1												1		1																									3	....	3
New Britain,	1	2				1							1		1	4	5		4		3					1	5	2	7	1				1				1		1		49	28	77
Newington,																																										5	4	9
Plainville,			1											1	1	1	2		1			2					1	2	3													7	3	10
Rocky Hill,																								1			1		1													2	3	5
Simsbury,							1		2				1		2	2	4									1		1	1													7	6	13
Southington,	1															1	1		2	1	1		1	1			4	2	6				2	2	1						1	16	20	36
South Windsor,																																										5	1	6
Suffield,			1													1	1					1					1		1													6	9	15
West Hartford,											1		1		1	1	2							1			1		1													4	3	7
Wethersfield,																								2	1		3		3													12	5	17
Windsor,																								1			1		1													7	4	11
Windsor Locks,												1	1		1	1	2		3					1			3	1	4													4	6	10
Total,	10	12	17	2	2	2	2	..	8	2	3	2	21	1	40	44	84	1	35	2	10	4	8	14	1	3	46	31	77	4	..	..	6	10	3	2	7	1	2	6	9	428	353	781

CLASS IV.—DEVELOPMENTAL DISEASES.

Towns in Hartford Co.	Order 1.—Of Children. Stillborn.	Premature Birth and Debility.	Cyanosis.	Spina Bifida.	Other Malformation.	Teething.	Total. M.	Total. F.	Orders 2, 3, and 4. Childbirth.	Old Age. M.	Old Age. F.	Atrophy and Debility. M.	Atrophy and Debility. F.	Total for Class IV. Male.	Female.	Total.
Hartford,	42	33	1	..	1	3	47	33	4	18	16	...	2	65	55	120
Avon,											5				5	5
Berlin,												1		1		1
Bloomfield,																
Bristol,			1					1	2	2	1			2	4	6
Burlington,																
Canton,	4	3	1				4	4		1	1			6	5	11
East Granby,											1				1	1
East Hartford,		1				1	1	1		1	8			2	9	11
East Windsor,										1	2			1	2	3
Enfield,	1	1	2			1	3	2	1	3	5			6	8	14
Farmington,			1				1			2	3		2	3	5	8
Glastonbury,		1					1			1	3			2	3	5
Granby,		1			1			2		1	1			1	3	4
Hartland,																
Manchester,	3		2				3	2	1		2			3	5	8
Marlborough,											1				1	1
New Britain,	7	4					6	4	1		3			6	8	15
Newington,											1				1	1
Plainville,		1			1		1	1						1	1	2
Rocky Hill,		1					1							1		1
Simsbury,		3					1	2		5	1	2		8	3	11
Southington,		3					1	2	1		3			1	6	7
South Windsor,		1			1			2		3	1			3	3	6
Snffield,	1	1					2			2	1			4	1	5
West Hartford,										2	2	1		3	2	5
Wethersfield,	1	1					2				2			2	2	4
Windsor,	2						1	1		1	4			2	5	7
Windsor Locks,		2					2				1			2	1	3
Total,	61	57	8	..	4	5	77	58	10	43	68	5	4	125	140	255

CLASS V.—VIOLENT DEATHS. / GRAND TOTAL FOR ALL CLASSES.

Towns in Hartford Co.	Order 1.—Accident and Negligence. Fracture and Contusion.	Wounds.	Burns and Scalds.	Poison.	Drowning.	Suffocation.	Otherwise.	Total. M.	Total. F.	Orders 3, 4, and 5. Homicide. M.	Suicide. M.	Suicide. F.	Violent, not Classed Casualty. M.	Violent, not Classed Casualty. F.	Cause not Reported. M.	Cause not Reported. F.	Total for Class V. Male.	Female.	Total.	Grand Total for All Classes. Males.	Females.	Sex not Stated.	Total.
Hartford,	3	..	2	..	4	..	19	23	5	..	4	2	7	3	2	6	36	16	52	465	376	....	841
Avon,	2								2									2	2	6	14	....	20
Berlin,																				19	14	....	33
Bloomfield,	1							1									1		1	9	7	....	16
Bristol,											1				1		2		2	43	42	....	85
Burlington,																				4	10	....	14
Canton,		2						2								2	2	2	4	34	28	....	62
East Granby,		1						1									1		1	3	3	....	6
East Hartford,											1				1		2		2	29	33	....	62
East Windsor,	1		1				1	3								1	3	1	4	21	24	....	45
Enfield,			1		4				5				1	2	3	2	4	9	13	64	70	....	134
Farmington,			1					1			1						2		2	16	22	....	38
Glastonbury,																				17	21	....	38
Granby,																				7	9	....	16
Hartland,																				2	4	....	6
Manchester,	1		1					1	1				2				3	1	4	55	56	....	111
Marlborough,																				6	1	....	7
New Britain,	1		1					2			1	1			11	11	14	12	28	138	93	3	234
Newington,																				14	10	....	24
Plainville,		1	1					1	1						2	3	3	4	7	22	17	....	39
Rocky Hill,																				4	5	....	9
Simsbury,																1		1	1	20	15	....	35
Southington,							1	1		1	1				2		5		5	46	46	....	92
South Windsor,															1		1		1	16	9	....	25
Snffield,				1				1						3	1		2	3	5	20	21	....	41
West Hartford,	1								1						1	2	2	4	6	11	11	....	22
Wethersfield,												1						1	1	25	13	....	38
Windsor,															1	1	1	1	3	15	25	1	41
Windsor Locks,			1					1								2		2	2	8	20	....	28
Total,	10	4	9	1	8	..	21	38	15	1	9	4	10	8	26	31	84	62	146	1139	1019	4	2162

NOTE.—As there were few when sex was not stated, they are included in the Totals—until the Grand Total.

CLASS I.—ZYMOTIC DISEASES.

Towns in New Haven Co.	Order I.—Miasmatic.																						Order II.—Enthetic.								Order III.—Dietic.					Total for Class I.		
	Small-pox.	Measles.	Scarlet Fever.	Diphtheria.	Quinsy.	Croup.	Whooping Cough.	Typhoid Fever.	Erysipelas.	Puerperal Fever.	Carbuncle.	Dysentery.	Diarrhea.	Cholera Infantum.	Malarial Fever.	Intermittent Fever.	Congestive Fever.	Remittent Fever.	Typho-Malarial Fever.	Rheumatism.	Cerebro-Spinal Meningitis.	Total. M.	Total. F.	Syphilis.	Malignant Pustule.	Septicaemia.	Thrush.	Worms.	Hydrophobia.	Total. M.	Total. F.	Purpura and Scurvy.	Privation and Neglect.	Alcholism.	Total. M.	Total. F.	Male.	Female.	Total.
New Haven,		21	5	44	1	24	23	18	6	12		3	20	49		6	4	3	27	8	5	126	153											6	5	1	131	154	285
Beacon Falls,		1				1																2															2		2
Bethany,									1													1												1	1		2		2
Branford,			2			2	2	4						2							1	6	7														6	7	13
Cheshire,							1						1										2															2	2
Derby,		1	1	3		4		1	2			2	4	10			1		1	1		10	21		1						1						10	22	32
East Haven,				1									1	1							1	2	2														2	2	4
Gailford,									1					1								1	1														1	1	2
Hamden,												1			1				3	1		3	3														3	3	6
Madison,								2	1					2						1		3	3														3	3	6
Meriden,				1		5	2	5	2	1		3	1	16			2		7		1	22	24			2	1			1	2			2	2		25	26	51
Middlebury,								2														1	1										1		1		2	1	3
Milford,								1						1			1	1	1			3	2														3	2	5
Naugatuck,				6			4	3				5		8					3			15	14														15	14	29
North Branford,																			3				3															3	3
North Haven,								1						2								3															3		3
Orange,				2		1						2		3					1			7	2														7	2	9
Oxford,																				1			1															1	1
Prospect,									1													1															1		1
Seymour,								3	1			1		4								6	3											1	1		7	3	10
Southbury,							1								1			1				2	1										1			1	2	2	4
Wallingford,						2		2											2		1	4	3			1					1			2	2		6	4	10
Waterbury,		4	14	3		9	12	5	2	1	1	1	4	15		2			1	3	7	38	46			3					3		1			1	38	50	88
Wolcott,																																							
Woodbridge,						1																1															1		1
Total,		27	22	60	1	49	45	47	17	14	1	18	31	114	2	8	8	5	49	15	16	257	292		1	6	1			1	7		3	12	12	3	270	302	572

Towns in New Haven Co.	CLASS II.—CONSTITUTIONAL DISEASES. Order 1.—Diathetic.						Order 2.—Tubercular.						Total for Class II.			CLASS III.—LOCAL DISEASES. Order 1.—Nervous System.												Orders 2 and 3.												
	Gout.	Dropsy and Anæmia.	Cancer.	Senile Gangrene.	Total. M.	Total. F.	Scrofula.	Tabes Mesenterica.	Phthisis.	Hydrocephalus.	Total. M.	Total. F.	Male.	Female.	Total.	Apoplexy.	Paralysis.	Insanity.	Epilepsy.	Tetanus.	Convulsions.	Meningitis.	Brain Disease.	Neuralgia.	Spinal Disease.	Total. M.	Total. F.	Embolism.	Heart Disease.	Aneurism.	Pericarditis.	Capillary Bronchitis.	Pleurisy.	Lung Disease.	Bronchitis.	Pneumonia.	Laryngitis.	Asthma.	Total. M.	Total. F.
New Haven,	1	15	26	1	15	28	4	33	145	6	96	92	111	120	231	13	35	2	6	11	48	24	16			84	71		48	1	2	13	1	27	30	42	4	9	87	90
Beacon Falls,			1		1								1		1	1										1			1							3			2	2
Bethany,		1	1		1	1			1		1		2	1	3																					1			1	
Branford,								1	4		3	2	3	2	5	3	2								1	5	1		1					1		3	1		4	2
Cheshire,			1	1	1	1			7		2	5	3	6	9	4	2				1	1				4	4		2							2			3	1
Derby,		4	3	1	1	7	1	8	20	6	20	15	21	22	43	4	7		1		13	8	2	1	2	13	25	2	6	1		2		3	1	17			17	15
East Haven,								1	1		1	1	1	1	2	3	1						2			4	2		2						1	1			3	1
Guilford,			1			1			9		5	4	5	5	10	2	2						1			2	3		2							2				4
Hamden,		1			1				1			1	1	1	2	2	2									3	1		2						1	3		1	2	5
Madison,		2			1	1			3		1	2	2	3	5	2	4					1	1			6	2		2				1						2	1
Meriden,		3	4		3	4		10	39	2	25	26	28	30	58	2	5	1			18	9	3			23	14		13	1			1	3	1	14			23	10
Middlebury,									2		1	1	1	1	2		3				1					2	2		2							3			2	3
Milford,			1		1				9		6	3	9	1	10	5	1				1	3	1			5	6							2					1	1
Naugatuck,			1			1			10		4	6	4	7	11	1					1					1	1		3							3			4	2
North Branford,									1		1		1		1														2										1	1
North Haven,									1			1		1	1		2									2										4			3	1
Orange,		3	1		2	2			3		1	2	3	4	7	2	3						1			3	3		3	1						2			3	3
Oxford,									3		3		3		3	1											1				1	1				2			2	2
Prospect,																	1						1			2			1							2			2	1
Seymour,		1			1				10		3	7	4	7	11	1	1					1				1	2		2							2			3	1
Southbury,									1		1		1		1								1			1			1					1		5			3	4
Wallingford,			2			2		1	4		2	3	2	5	7	3	5			1	3	2				9	5		2							9			4	7
Waterbury,		2	3		1	4	1		60	3	33	31	34	35	69	8	8		1		25	6	9			28	29	1	14			4	1		2	41			32	31
Wolcott,			1			1								1	1								1			1										1			1	
Woodbridge,									1			1		1	1		1										1		2							1			1	2
Total,	1	32	46	3	29	53	6	54	335	17	209	203	238	256	494	57	85	3	8	12	111	55	39	1	3	200	173	3	111	4	3	20	4	37	36	163	5	10	206	190

CLASS III.—LOCAL DISEASES—Continued.

ORDER 4.—DIGESTIVE ORGANS.

Towns in New Haven Co.	Gastritis.	Enteritis.	Peritonitis.	Ascites.	Ulceration of Intestines.	Intussusception.	Hernia.	Stricture Intestines.	Stomach Disease.	Colic.	Hepatitis.	Jaundice.	Liver Disease.	Fistula.	Male.	Female.	Total.
New Haven,	16	10	11	1	2			2	5		4	1	11		31	32	63
Beacon Falls,													1		1		1
Bethany,			1						1						2		2
Branford,											1					1	1
Cheshire,		1					1								1	1	2
Derby,	3	5	5								1		1		6	9	15
East Haven,																	
Guilford,			1	1											2		2
Hamden,	1		1										1		2	1	3
Madison,																	
Meriden,	2	3	1		1			1			1				4	5	9
Middlebury,	1															1	1
Milford,			1												1		1
Naugatuck,	1	2	2												2	3	5
North Branford,			1										1		2		2
North Haven,																	
Orange,		2													1	1	2
Oxford,																	
Prospect,																	
Seymour,								1							1		1
Southbury,									1						1		1
Wallingford,													1		1		1
Waterbury,	3	3	12								1		2		10	11	21
Wolcott,																	
Woodbridge,																	
Total,	27	26	36	2	3		1	4	7		8	1	18		68	65	133

ORDER 5.—URINARY ORGANS.

Towns in New Haven Co.	Disease of Spleen.	Bright's Disease.	Nephritis.	Diabetes.	Calculus.	Cystitis.	Kidney Disease.	Prostatitis.	Uremia.	Male.	Female.	Total.
New Haven,		21	8	2			4		1	22	14	36
Beacon Falls,												
Bethany,												
Branford,			3			1				2	2	4
Cheshire,		1							1	1	1	2
Derby,		3									3	3
East Haven,												
Guilford,		2								2		2
Hamden,												
Madison,												
Meriden,		1					2			3		3
Middlebury,												
Milford,												
Naugatuck,												
North Branford,		1									1	1
North Haven,												
Orange,				1							1	1
Oxford,												
Prospect,												
Seymour,				1							1	1
Southbury,												
Wallingford,		2						1		3		3
Waterbury,		6				3			1	9	1	10
Wolcott,												
Woodbridge,												
Total,		37	11	4		4	6	1	3	42	24	66

ORDER 6.—GENERATIVE ORGANS. ORDER 8.—INTEGUMENTARY SYSTEM.

Towns in New Haven Co.	Ovarian Dropsy.	Ovarian Tumor.	Uterine Tumor.	Disease of Uterus.	Total.
New Haven,		2		10	12
Beacon Falls,					
Bethany,					
Branford,					
Cheshire,		1			1
Derby,					
East Haven,					
Guilford,					
Hamden,		1			1
Madison,					
Meriden,				1	1
Middlebury,					
Milford,					
Naugatuck,					
North Branford,					
North Haven,					
Orange,					
Oxford,					
Prospect,					
Seymour,					
Southbury,					
Wallingford,					
Waterbury,	1			1	2
Wolcott,					
Woodbridge,					
Total,	1	4		12	17

Towns in New Haven Co.	Ulcer.	Phlegmon.	Tumor.	Joint Disease.	Disease of Skin.	Male.	Female.
New Haven,	2	2			2	1	5
Beacon Falls,							
Bethany,							
Branford,							
Cheshire,							
Derby,			1				1
East Haven,							
Guilford,							
Hamden,							
Madison,							
Meriden,		2				1	1
Middlebury,							
Milford,							
Naugatuck,							
North Branford,							
North Haven,							
Orange,							
Oxford,							
Prospect,							
Seymour,							
Southbury,							
Wallingford,							
Waterbury,	1					1	
Wolcott,							
Woodbridge,							
Total,	3	4	1		2	3	7

TOTAL FOR CLASS III.

Towns in New Haven Co.	Males.	Females.	Total.
New Haven,	225	224	449
Beacon Falls,	4	2	6
Bethany,	3		3
Branford,	11	6	17
Cheshire,	9	8	17
Derby,	36	53	89
East Haven,	7	3	10
Guilford,	6	7	13
Hamden,	7	8	15
Madison,	8	3	11
Meriden,	54	31	86
Middlebury,	4	6	10
Milford,	7	7	14
Naugatuck,	7	6	13
North Branford,	3	2	5
North Haven,	5	1	6
Orange,	7	8	15
Oxford,	2	3	5
Prospect,	4	1	5
Seymour,	5	4	9
Southbury,	5	4	9
Wallingford,	17	12	29
Waterbury,	80	74	154
Wolcott,	1		1
Woodbridge,	1	3	4
Total,	518	476	994

Towns in New Haven Co.	CLASS IV.—DEVELOPMENTAL DISEASES. Order 1.—Of Children. Stillborn.	Premature Birth.	Cyanosis.	Spina Bifida.	Malformations.	Teething.	Total. M.	Total. F.	Orders 2, 3, and 4. Childbirth.	Old Age. M.	Old Age. F.	Atrophy and Debility. M.	Atrophy and Debility. F.	Total for Class IV. Male.	Female.	Sex not stated.	Total.
New Haven,....	44	42	3	1	3	5	51	47	2	16	30	6	12	73	91		164
Beacon Falls,....	1							1							1		1
Bethany,........	2						1							1		1	2
Branford,........			2				1	1	1	2				3	2		5
Cheshire,........										2			1	2	1		3
Derby,..........	10	8		1	1		17	3				1		16	3	2	21
East Haven,.....	1	1					1	1		1	1			2	2		4
Guilford,........		1	1		1		1	2		1	4			2	6		8
Hamden,........	1						1				1	1		2	1		3
Madison,........		1						1			1		2		4		4
Meriden,........	15	14					17	7	2	5	6			22	15	5	42
Middlebury,......																	
Milford,........										5	3			5	3		8
Naugatuck,......	8						4	4	1	2	3	2	3	6	7	6	19
North Branford,..																	
North Haven,....		1					1							1			1
Orange,........	5	2				1	6	1		1				7	1	1	9
Oxford,........		1						1		2			1	2	2		4
Prospect,........										1				1			1
Seymour,........		1					1			1	1		1	2		2	4
Southbury,......											4				4		4
Wallingford,.....										2				2			2
Waterbury,......	24	15	1	1	1	4	25	13	1	5	16	3	2	33	32	8	73
Wolcott,........	1						1				1			2			2
Woodbridge,.....	1	1					1	1		1	2			1	3	1	5
Total,......	113	88	7	3	6	10	129	83	7	47	73	13	22	185	178	26	389

Towns in New Haven Co.	CLASS V.—VIOLENT DEATHS. Order 1.—Accident and Negligence. Railroad Accidents.	Fractures.	Wounds.	Burns and Scalds.	Poison.	Drowning.	Suffocation.	Otherwise.	Total. M.	Total. F.	Orders 3, 4, and 5. Homicide. M.	Suicide. M.	Suicide. F.	Violent not Classed Casualty. M.	Violent not Classed Casualty. F.	Cause not Reported. M.	Cause not Reported. F.	Total for Class V. Male.	Female.	Total.	Grand Total for All Classes. Male.	Female.	Sex not stated.	Total.
New Haven,....		9	13	4	1	4	2	14	35	12		2	3					37	15	52	577	604		1181
Beacon Falls,....						1			1									1		1	8	3		11
Bethany,........																					8	1	1	10
Branford,........								1	1									1		1	24	17		41
Cheshire,........												2		1				3		3	17	17		34
Derby,..........	3	1		2		2	1		8	1						1		9	1	10	92	101	2	195
East Haven,.....						1			1									1		1	13	8		21
Guilford,........												1				1		2		2	16	19		35
Hamden,........	2								1	1								1	1	2	14	14		28
Madison,........														1				1		1	14	13		27
Meriden,........		4					1	1	4	2		3			1	2	3	9	6	15	138	108	6	252
Middlebury,......		1							1									1		1	8	8		16
Milford,........																					22	15		37
Naugatuck,......				1						1		1	1		1	1	1	1	2	3	34	36	8	78
North Branford,..												1					1	1	1	2	5	6		11
North Haven,....																					8	2	1	11
Orange,........		1							1			1		1	1	1		4	1	5	28	16	1	45
Oxford,........								1	1									1		1	8	6		14
Prospect,........																					6	1		7
Seymour,........		2				1			3									3		3	21	14	2	37
Southbury,......	1			2					2	1			1			1	1	3	3	6	11	13		24
Wallingford,.....	1			3					1	3					1		2	1	6	7	28	27		55
Waterbury,......		6		3		1	1	2	10	3		1		1	2	2		14	5	19	199	196	8	403
Wolcott,........																					4	1		5
Woodbridge,.....															1				1	1	4	7	1	12
Total,......	7	24	13	15	1	10	5	19	70	24	..	12	5	4	7	9	8	94	42	136	1307	1253	30	2590

CLASS I.—ZYMOTIC DISEASES.

Towns in New London Co.	Order I.—Miasmatic. Small-pox.	Measles.	Scarlet Fever.	Diphtheria.	Croup.	Whooping Cough.	Typhoid Fever.	Erysipelas.	Puerperal Fever.	Carbuncle.	Dysentery.	Diarrhea.	Cholera Infantum.	Malarial Fever.	Intermittent Fever.	Remittent Fever.	Congestive Fever.	Typho-Malarial Fever.	Rheumatism.	Cerebro-Spinal Meningitis.	Total. M.	Total. F.	Syphilis.	Order II.—Enthetic. Exophthalmic Goitre.	Septicaemia	Thrush.	Hydrophobia.	Total. M.	Total. F.	Order III.—Dietic. Privation and Neglect.	Purpura and Scurvy.	Alcoholism.	Total. M.	Total. F.	Total for Class I. Male.	Female.	Total.
New London,...	5	..	16	89	4	2	4	2	1	..	..	1	10	..	..	..	..	..	..	1	73	62	..	..	..	..	..	..	..	..	..	1	1	..	74	62	136
Norwich,...	..	..	1	8	4	7	7	2	4	..	1	7	23	..	..	..	1	..	2	5	40	32	..	..	..	..	..	..	..	..	1	2	3	..	43	32	75
Bozrah,...	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Colchester,...	..	..	..	..	..	1	1	1	1	..	1	1	..	..	..	..	..	..	..	..	4	2	..	..	..	..	..	..	..	..	..	..	..	..	4	2	6
East Lyme,...	..	..	..	1	..	..	2	..	1	..	..	..	1	1	1	..	..	..	..	..	3	4	..	..	..	..	..	..	..	..	..	..	..	..	3	4	7
Franklin,...	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	1	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	2
Griswold,...	..	..	..	..	1	..	3	1	1	..	2	1	4	..	..	..	..	..	..	..	7	6	..	..	1	..	..	..	1	..	..	..	..	..	7	7	14
Groton,...	..	..	2	5	..	..	5	1	..	..	1	..	2	..	..	..	..	..	..	..	5	11	..	..	..	1	..	1	..	..	..	..	..	..	6	11	17
Lebanon,...	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..	..	1	..	..	..	1	..	..	..	..	..	..	2	2
Ledyard,...	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	1	..	..	1	..	..	..	..	..	..	2	..	2
Lisbon,...	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Lyme,...	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Montville,...	..	..	8	..	..	1	2	..	..	..	1	..	..	..	..	..	..	..	1	..	7	6	..	..	..	..	..	..	..	..	..	..	..	..	7	6	13
No. Stonington,...	..	..	3	..	..	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	3	2	..	..	..	..	..	..	..	..	..	..	..	..	3	2	5
Old Lyme,...	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	2	..	..	1	2	..	..	..	..	..	..	..	..	..	..	..	..	1	2	3
Preston,...	..	..	..	..	1	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	1	2	..	..	..	..	..	..	..	..	..	..	..	..	1	2	3
Salem,...	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
Sprague,...	..	..	..	..	2	1	..	..	..	..	..	..	7	..	..	..	..	..	2	..	8	4	..	..	1	..	..	..	1	..	..	..	..	..	8	5	13
Stonington,...	..	..	8	6	2	..	5	..	..	..	..	2	5	..	..	..	1	..	..	..	15	14	..	..	..	..	..	..	..	..	..	..	..	..	15	14	29
Waterford,...	1	..	1	4	..	..	1	..	..	..	1	1	2	..	..	..	..	..	1	..	8	4	..	..	..	..	..	..	..	..	..	..	..	..	8	4	12
Total,...	6	..	39	113	14	12	32	9	8	..	8	14	56	1	1	..	2	2	7	7	179	152	..	..	4	1	..	2	3	..	1	3	4	..	185	155	340

CLASS II.—CONSTITUTIONAL DISEASES.

Towns in New London Co.	Order 1.—Diathetic.					Order 2.—Tubercular.						Total for Class II.		
	Dropsy and Anæmia.	Cancer.	Senile Gangrene.	Total. M.	Total. F.	Scrofula.	Tabes Mesenterica.	Phthisis.	Hydrocephalus.	Total. M.	Total. F.	Male.	Female.	Total.
New London,...	5	3	..	4	4	1	1	29	2	13	20	17	24	41
Norwich,........	2	13	..	5	10	2	1	63	3	29	40	34	50	84
Bozrah,.........	....	..	..	..	..	..	....	3	..	1	2	1	2	3
Colchester,......	....	1	2	1	2	..	....	11	1	4	8	5	10	15
East Lyme,......	1	1	..	1	1	..	....	4	..	2	2	3	3	6
Franklin,........	....	1	..	..	1	..	....	....	..	....	....	....	1	1
Griswold,........	....	..	..	..	..	1	....	9	..	6	4	6	4	10
Groton,..........	3	3	..	1	5	..	....	22	..	10	12	11	17	28
Lebanon, ...	....	1	..	..	1	..	....	4	..	...	4	....	5	5
Ledyard,........	2	..	..	..	2	..	....	2	..	....	2	....	4	4
Lisbon,.........	....	1	..	..	1	..	....	1	..	....	1	....	2	2
Lyme,..........	....	..	..	..	..	..	....	2	..	....	2	....	2	2
Montville,.......	1	..	..	..	1	..	....	4	..	2	2	2	3	5
No. Stonington,..	1	1	1	2	1	1	....	8	..	2	7	4	8	12
Old Lyme,.......	....	1	1	1	1	..	....	6	..	1	5	2	6	8
Preston, ...	....	1	..	..	1	..	....	7	..	3	4	3	5	8
Salem,..........	....	2	..	..	2	..	....	....	..	....	....	....	2	2
Sprague,........	1	2	..	..	3	..	....	9	..	2	7	2	10	12
Stonington, ...	....	3	..	..	3	1	2	15	..	8	10	8	13	21
Waterford, ...	....	1	..	..	1	..	....	9	..	2	7	2	8	10
Total,.......	16	35	4	15	40	6	4	208	6	85	139	100	179	279

CLASS III.—LOCAL DISEASES.

Towns in New London Co.	Order 1.—Nervous System.											
	Apoplexy.	Paralysis.	Insanity.	Epilepsy.	Tetanus.	Convulsions.	Meningitis.	Brain Disease.	Neuralgia.	Spinal Disease.	Total. M.	Total. F.
New London,...	4	9	..	..	..	3	1	9	..	..	14	12
Norwich,........	9	16	..	1	..	13	14	9	..	..	33	29
Bozrah,.........	2	..	..	..	..	..	..	1	..	..	2	1
Colchester,......	2	2	..	..	..	..	2	1	..	1	4	4
East Lyme,......	1	3	..	1	..	..	1	..	..	1	3	4
Franklin,........	..	..	1	..	..	..	..	..	..	..	....	1
Griswold,........	..	2	1	..	..	..	4	1	..	..	5	3
Groton,..........	5	7	1	1	..	..	..	2	..	..	7	9
Lebanon, ...	..	..	..	..	..	..	2	1	..	..	....	3
Ledyard,........	..	..	..	..	..	..	..	..	..	..	....	....
Lisbon,.........	..		..	..	..	..	..	..	..	..	....	....
Lyme,..........	3	..	..	..	..	1	..	..	..	..	2	2
Montville,.......	2	1	2	..	..	..	3	1	..	1	4	6
No. Stonington,..	..	..	..	..	..	..	..	..	..	..	....	....
Old Lyme,.......	1	1	1	..	..	..	..	..	..	..	....	3
Preston, ...	1	1	..	..	..	..	..	2	..	..	3	1
Salem,..........	..	1	..	..	..	..	..	..	..	..	....	1
Sprague,........	2	..	..	1	..	2	..	..	..	..	3	2
Stonington, ...	2	4	..	..	..	2	1	2	..	3	8	6
Waterford, ...	..	4	1	..	..	1	..	2	..	..	4	4
Total,.......	34	51	7	4	..	22	28	31	..	6	92	91

Towns in New London Co.	Orders 2 and 3.														
	Aneurism.	Heart Disease.	Pericarditis.	Angina Pectoris.	Total. M.	Total. F.	Lung Disease.	Capillary Bronchitis.	Bronchitis.	Pneumonia.	Pleurisy.	Laryngitis.	Asthma.	Total. M.	Total. F.
New London,...	..	13	..	..	6	7	2	....	..	5	..	..	..	3	4
Norwich,........	2	11	11	..	10	14	5	....	5	33	1	..	1	24	21
Bozrah,.........	..	1	..	..	1	..	..	....	..	3	..	..	1	3	1
Colchester,......	..	4	..	..	2	2	..	....	..	1	..	1	..	1	1
East Lyme,......	..	1	..	..	1	..	..	....	1	1	..	..	..	2	....
Franklin,........	..	2	..	..	..	2	1	....	..	3	..	..	..	2	2
Griswold,........	..	3	..	..	1	2	..	....	..	3	..	..	3	3	3
Groton,..........	..	9	..	..	4	5	2	....	..	5	..	..	..	5	2
Lebanon, ...	..	....	..	..	..	..	..	....	1	1	..	..	..	....	2
Ledyard,........	..	3	..	..	3	..	..	....	..	3	..	..	..	1	2
Lisbon,.........	..	....	..	..	..	..	..	....	..	....	..		..	....	....
Lyme,..........	..	2	..	..	1	1	1	....	..	2	..	..	..	3	....
Montville,.......	..	5	..	1	3	3	1	....	1	5	..	..	..	4	3
No. Stonington,..	..	2	..	..	1	1	..	....	..	5	..	..	..	1	4
Old Lyme,.......	..	5	..	..	4	1	..	....	..	....	..	..	..	....	....
Preston, ...	..	3	..	..	1	2	2	....	..	3	..	..	..	3	2
Salem,..........	..	....	..	..	..	..	..	....	..	1	..	..	..	1	....
Sprague,........	..	2	..	..	1	1	..	....	..	6	1	..	..	3	4
Stonington, ...	..	4	..	..	2	2	..	....	..	9	1	..	5	7	8
Waterford, ...	..	3	..	..	..	3	..	....	2	1	..	..	..	1	2
Total,.......	2	73	11	1	41	46	14	....	10	90	3	1	10	67	61

CLASS III.—LOCAL DISEASES—Continued.

Order 4.—Digestive Organs.

Towns in New London Co.	Gastritis.	Enteritis.	Peritonitis.	Ascites.	Ulceration of Intestines.	Intussusception.	Hernia.	Stricture Intestines.	Stomach Disease.	Colic.	Hepatitis.	Liver Disease.	Jaundice.	Fistula.	Male.	Female.	Total.
New London,	2		1						1		1	4			4	5	9
Norwich,	3	1	3	1	2			1	3		2	6	1		12	11	23
Bozrah,																	
Colchester,		1					1			1		1			3	1	4
East Lyme,																	
Franklin,																	
Griswold,																	
Groton,			2							4					3	3	6
Lebanon,																	
Ledyard,												1				1	1
Lisbon,	1															1	1
Lyme,																	
Montville,	1															1	1
No. Stonington,			3									1	1		3	2	5
Old Lyme,																	
Preston,		1					1								1	1	2
Salem,																	
Sprague,								1							1		1
Stonington,	1										1					2	2
Waterford,																	
Total,	8	3	9	1	2	..	2	2	4	5	4	13	2	..	27	28	55

Order 5.—Urinary Organs.

Towns in New London Co.	Disease of Spleen.	Nephritis.	Bright's Disease.	Diabetes.	Calculus.	Cystitis.	Kidney Disease.	Prostatitis.	Uremia.	Male.	Female.	Total.
New London,		1		1							2	2
Norwich,	1	1	9	1			1			6	7	13
Bozrah,												
Colchester,			2							1	1	2
East Lyme,												
Franklin,							1			1		1
Griswold,												
Groton,						1	1			2		2
Lebanon,												
Ledyard,			1								1	1
Lisbon,												
Lyme,												
Montville,				1						1		1
No. Stonington,												
Old Lyme,												
Preston,												
Salem,			1								1	1
Sprague,			1							1		1
Stonington,			3							2	1	3
Waterford,				1						1		1
Total,	1	2	17	4	..	1	3	..	..	15	13	28

Order 6.—Generative Organs.

Towns in New London Co.	Ovarian Dropsy.	Ovarian Tumor.	Uterine Tumor.	Disease of Uterus.	Total.
New London,		1			1
Norwich,				1	1
Bozrah,					
Colchester,					
East Lyme,					
Franklin,					
Griswold,					
Groton,					
Lebanon,					
Ledyard,					
Lisbon,					
Lyme,					
Montville,					
No. Stonington,					
Old Lyme,					
Preston,					
Salem,					
Sprague,					
Stonington,					
Waterford,					
Total,	..	1	..	1	2

Order 8.—Integumentary System. / Total for Class III.

Towns in New London Co.	Ulcer.	Phlegmon.	Tumor.	Joint Disease.	Arthritis.	Male.	Female.	Males.	Females.	Total.
New London,								27	31	58
Norwich,	4				1	2	3	87	86	173
Bozrah,								6	2	8
Colchester,								11	9	20
East Lyme,								6	4	10
Franklin,								3	5	8
Griswold,								9	8	17
Groton,		1					1	21	20	41
Lebanon,									5	5
Ledyard,								4	4	8
Lisbon,									1	1
Lyme,								6	3	9
Montville,			2			1	1	13	14	27
No. Stonington,								5	7	12
Old Lyme,								4	4	8
Preston,								8	6	14
Salem,								1	2	3
Sprague,								9	7	16
Stonington,			1				1	19	20	39
Waterford,								6	9	15
Total,	4	1	3	..	1	3	6	245	247	492

CLASS IV.—DEVELOPMENTAL DISEASES.

Towns in New London Co.	Order 1.—Of Children. Stillborn.	Premature Birth.	Cyanosis.	Spina Bifida.	Malformations.	Teething.	Orders 2, 3, and 4. Total. M.	Total. F.	Childbirth.	Old Age. M.	Old Age. F.	Atrophy and Debility. M.	Atrophy and Debility. F.	Total for Class IV. Male.	Female.	Total.
New London,	9	6	..	..	..	..	6	8	2	6	7	1	5	13	22	36
Norwich,	20	..	1	..	1	2	14	10	1	8	13	7	11	29	35	64
Bozrah,	1	1	..	..	..	..	1	1	1	..	..	..	..	1	1	3
Colchester,	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	1
East Lyme,	1	..	..	..	..	..	..	1	..	..	1	..	..	..	2	2
Franklin,	2	..	..	..	..	..	..	2	..	..	..	..	..	..	2	4
Griswold,	5	..	1	..	..	..	4	2	..	..	..	..	..	4	2	6
Groton,	..	1	..	..	..	..	1	..	2	2	4	..	2	3	8	11
Lebanon,	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	1
Ledyard,	5	..	..	..	..	..	2	3	..	..	..	..	..	2	3	5
Lisbon,	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	1
Lyme,	3	..	..	..	..	..	..	3	..	..	..	..	..	..	3	3
Montville,	..	..	..	..	..	..	..	..	1	3	2	2	..	5	3	8
No. Stonington,	..	1	..	..	..	..	1	..	..	..	1	..	..	1	1	2
Old Lyme,	..	..	..	..	..	..	..	..	..	1	1	..	..	1	1	2
Preston,	..	2	..		..	..	1	1	..	2	..	..	..	3	1	4
Salem,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Sprague,	..	..	..	..	..	1	..	1	..	..	..	..	1	..	2	2
Stonington,	..	3	..	..	..	..	1	2	..	1	3	..	..	2	5	7
Waterford,	..	1	..	..	..	..	1	..	1	1	1	..	..	2	2	4
Total,	46	15	2	..	1	3	32	35	8	25	35	10	19	67	99	166

CLASS V.—VIOLENT DEATHS.

Towns in New London Co.	Order 1.—Accident and Negligence. Railroad Accidents.	Fractures.	Wounds.	Burns and Scalds.	Poison.	Drowning.	Suffocation.	Otherwise.	Total. M.	Total. F.	Orders 3, 4, and 5. Homicide. M.	Suicide. M.	Suicide. F.	Violent, not Classed. M.	Violent, not Classed. F.	Cause not Reported. M.	Cause not Reported. F.	Total for Class V. Male.	Female.	Not stated.	Total.
New London,	..	..	..	1	..	3	..	1	4	1	..	1	..	..	1	4	..	9	2	..	11
Norwich,	..	4	3	2	..	7	1	2	15	4	..	..	..	3	1	2	1	20	6	..	26
Bozrah,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	2	..	2
Colchester,	1	..	1	..	2	..	..	..	3	1	..	..	..	..	1	3	4	6	6	1	13
East Lyme,	..	..	..	..	..	1	..	..	1	..	..	..	..	..	..	1	2	2	2	..	4
Franklin,	..	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	1
Griswold,	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	1
Groton,	1	..	..	..	..	2	..	..	3	..	..	..	..	..	..	1	..	4	..	2	6
Lebanon,	..	..	..	..	..	1	1	1	1	2	..	..	..	..	..	..	..	1	2	..	3
Ledyard,	..	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	1
Lisbon,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
Lyme,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Montville,	..	1	..	1	..	..	..	..	1	1	..	1	..	..	..	1	1	3	2	..	5
No. Stonington,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Old Lyme,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	1	1	2	..	3
Preston,	..	1	..	..		1	..	..	..	2	..	..	..	1	2	1	5	2	9	..	11
Salem,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Sprague,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	1
Stonington,	2	2	1	1	..	10	..	..	10	6	..	..	..	..	1	5	1	15	8	..	23
Waterford,	1	1	..	..	..	..		..	2	..	..	..	..	..	..	2	..	4	..	..	4
Total,	5	11	5	5	2	25	2	4	42	17	..	2	..	5	8	21	17	70	42	4	116

Grand Total for All Classes.

Towns in New London Co.	Males.	Females.	Not stated.	Total.
New London,	139	142	1	282
Norwich,	213	209	..	422
Bozrah,	8	7	1	16
Colchester,	26	28	1	55
East Lyme,	14	15	..	29
Franklin,	6	6	2	14
Griswold,	27	21	..	48
Groton,	45	56	2	103
Lebanon,	1	15	..	16
Ledyard,	9	11	..	20
Lisbon,	1	3	1	5
Lyme,	6	8	..	14
Montville,	30	28	..	58
No. Stonington,	13	18	..	31
Old Lyme,	9	15	..	24
Preston,	17	23	..	40
Salem,	2	4	..	6
Sprague,	19	25	..	44
Stonington,	59	60	..	119
Waterford,	22	23	..	45
Total,	666	717	8	1391

CLASS I.—ZYMOTIC DISEASES.

Towns in Fairfield Co.	Order I.—Miasmatic.																						Order II.—Enthetic.								Order III.—Dietic.					Total for Class I.			
	Small-pox.	Measles.	Scarlet Fever.	Diphtheria.	Quinsy.	Croup.	Whooping Cough.	Typhoid Fever.	Erysipelas.	Puerperal Fever.	Carbuncle.	Dysentery.	Diarrhea.	Cholera Infantum.	Malarial Fever.	Intermittent Fever.	Congestive Fever.	Typho-Malarial Fever.	Remittent Fever.	Rheumatism.	Cerebro-Spinal Meningitis.	Total. M.	Total. F.	Septicaemia.	Syphilis.	Malignant Pustule.	Thrush.	Worms.	Hydrophobia.	Total. M.	Total. F.	Purpura and Scurvy.	Alcoholism.	Privation and Neglect.	Total. M.	Total. F.	Male.	Female.	Sex not stated.	Total.
DANBURY,	1	..	1	..	..	1	..	4	..	..	..	2	..	9	..	..	1	5	..	2	....	12	12	..	..	....	..	..	..	..	..	....	..	....	..	..	12	12	2	26
Bridgeport,	..	2	..	29	1	31	4	10	2	2	..	2	2	32	..	1	3	3	..	2	2	60	68		1	....	1	.	..	2	.	1	..	....	1	..	63	68	..	131
Bethel,	..	..	..	..	..	1	..	1	1	1	..	..	..	2	..	1	..	....	1	1	....	4	5	..	..	....	..	..	..	..	..	....	..	....	..	..	4	5	..	9
Brookfield,	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	..	..	....	..	..	....	....	....	..	..	....	..	..	..	..	..	....	..	....	..	..	....	....	..	....
Darien,	..	..	..	1	..	..	..	4	..	..	..	..	..	3	..	..	..	....	..	..	....	4	4		..	....	..	..	..	..	..	....	..	....	..	..	4	4	..	8
Easton,	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	..	..	....	..	..	....	....	....	..	..	....	..	..	..	..	..	....	1	....	1	..	1	....	..	1
Fairfield,	..	..	1	1	..	..	..	..	..	1		..	..	4	..	..	..	2	..	..	....	5	4	1	..	....	..	..	..	1	..	....	..	....	..	..	6	4	..	10
Greenwich,	..	..	1	3	..	2	2	..	1	..	..	..	..	7	..	1	..	2	..	1	....	7	13	..	..	....	..	..	..	..	..	....	..	....	..	..	7	13	..	20
Huntington,	..	1	1	2	..	..	1	2	..	1	..	2	..	4	..	..	..	....	..	..	....	6	8	..	..	....	..	..	..	..	..	....	..	....	..	..	6	8	..	14
Monroe,	..	..	..	..	..	..	1	..	..	..	..	..	..	....	..	..	..	....	..	..	....	1	....	..	..	....	..	..	..	..	..	....	..	....	..	..	1	....	..	1
New Canaan,	..	..	..	..	..	..	1	3	..	..	..	..	..	1	..	..	..	3	..	..	....	4	4	..	..	....	..	..	..	..	..	....	1	....	..	1	4	5	..	9
New Fairfield,	..	..	..	2	..	..	..	..	..	..	..	1	.	....	..	..	..	....	..	..	....	2	1	..	..	....	..	..	1	1	..	....	..	....	..	..	3	1	..	4
Newton,	..	..	..	1	..	..	..	1	..	..	..	..	..	6	..	..	1	1		..	....	5	5	..	..	....	..	..	..	..	..	....	..	....	..	..	5	5	..	10
Norwalk,	..	2	4	..	..	3	..	1		..	..	4	..	12	..	1	..	7	..	1	6	20	21	..	..	....	..	1	..	..	1	....	..	1	1	..	21	22	..	43
Reading,	..	..	..	1	..	..	..	..	..	..	..	..	..	....	..	..	..	....	..	..	....	....	1	..	..	....	..	..	..	..	..	....	..	....	..	..	....	1	..	1
Ridgefield,	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	....	....	1	..	..	....	..	..	..	..	..	....	..	....	..	..	....	1	..	1
Sherman,	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	..	..	....	..	..	....	....	....	..	..	....	..	..	..	..	..	....	..	....	..	..	....	....	..	....
Stamford,	1	1	..	1	..	..	5	1	1	..	..	..	1	9	..	1	2	5	..	4	....	20	12	..	..	....	..	..	..	..	..	....	..	....	..	..	20	12	.	32
Stratford,	..	..	..	1	..	..	1	..	..	1	..	..	1	....	..	..	..	....	..	..	....	2	2	..	..	....	..	..	..	..	..	..	.	....	..	..	2	2	..	4
Trumbull,	..	..	..	..	..	..	..	1	..	..	..	..	..	1	1	.	..	....	..	..	....	3	....	..	..	....	..	..	..	..	..	....	..	....	..	..	3	....	..	3
Weston,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	..	..	....	....	....	..	..		..	..	..	..	..	....	..	....	..	..	....	....	..	....
Westport,	..	..	..	..	..	..	..	3	..	..	..	..	1	...	..	..	2	2	..	..	....	3	5	..	..	....	..	.	..	..	..	....	.	....	..	..	3	5	..	8
Wilton,	..	..	..	..	..	..	1	.	.	..	..	..	..	2	..	..	..	....	..	..	....	2	1	..	..	....	..	..	..	..	..	....	..	....	..	..	2	1	..	3
Total,	2	6	8	42	1	38	16	31	5	6	..	11	5	93	1	5	9	30	1	11	8	160	167	1	1	...	1	1	1	4	1	1	2	1	3	1	167	169	2	338

CLASS II.—CONSTITUTIONAL DISEASES.

Towns in Fairfield Co.	Order 1.—Diathetic. Dropsy and Anæmia.	Cancer.	Mortification.	Total. M.	Total. F.	Order 2.—Tubercular. Scrofula.	Tabes Mesenterica.	Phthisis.	Hydrocephalus.	Total. M.	Total. F.	Total for Class II. Male.	Female.	Total.
Danbury,	1	8	..	1	8	3	....	24	2	17	12	18	20	38
Bridgeport,	13	6	1	8	12	1	7	64	4	39	37	47	49	96
Bethel,	1	1	..	..	2	1	1	9	..	8	3	8	5	13
Brookfield,	2	1	..	..	3	..	....	1	..	1	....	1	3	4
Darien,	....	..	..	..	..	..	1	1	..	1	1	1	1	2
Easton,	....	..	..	..	..	..	1	1	.	2	...	2	....	2
Fairfield,	2	..	..	..	2	..	....	5	..	3	2	3	4	7
Greenwich,	2	..	..	2	..	..	1	10	2	4	9	6	9	15
Huntington,	....	..	..	..	..	..	....	2	..	2	...	2	....	2
Monroe,	....	..	..	..	..	1	...	2	.	....	3	....	3	3
New Canaan,	....	..	..	..	..	..	....	9	1	6	4	6	4	10
New Fairfield,	1	1	..	1	1	..	....	1	..	1	....	2	1	3
Newtown,	....	..	..	..	..	..	....	8	1	4	5	4	5	9
Norwalk,	4	5	..	4	5	..	2	24	..	11	15	15	20	35
Redding,	1	2	..	3	..	..	....	3	..	...	3	3	3	6
Ridgefield,	1	2	..	2	1	..	....	2	..	....	2	2	3	5
Sherman,	....	1	..	..	1	..	....	2	..	....	2	....	3	3
Stamford,	6	4	1	3	8	..	....	25	..	12	13	15	21	36
Stratford,'	1	1	..	1	1	..	....	2	..	....	2	1	3	4
Trumbull,	....	..	..	..	..	..	....	3	..	3	....	3	....	3
Weston,	....	2	..	..	2	..	....	2	..	1	1	1	3	4
Westport,	....	1	..	1	..	..	....	6	..	3	3	4	3	7
Wilton,	3	1	..	1	3	1	....	5	..	3	3	4	6	10
Total,	38	36	2	27	49	7	13	211	10	121	120	148	169	317

CLASS III.—LOCAL DISEASES.

Towns in Fairfield Co.	Order 1.—Nervous System. Apoplexy.	Paralysis.	Insanity.	Epilepsy.	Tetanus.	Convulsions.	Meningitis.	Brain Disease.	Spinal Disease.	Neuralgia.	Total. M.	Total. F.
Danbury,	6	4	..	..	..	6	..	1	.	..	5	11
Bridgeport,	6	7	3	1	..	19	8	18	3	..	35	30
Bethel,	2	4	..	..	..	1	1	2	..	..	8	2
Brookfield,	1	3	..	..	..	..	1	1	..	..	4	2
Darien,	..	4	..	..	..	..	..	1	..	..	1	4
Easton,	1	..	..	..	..	..	..	..	..	..	1	....
Fairfield,	3	3	..	..	..	2	..	1	..	..	5	4
Greenwich,	4	5	..	..	..	..	1	..	2	..	5	7
Huntington,	2	1	..	..	..	..	2	3	..	..	3	5
Monroe,	1	..	..	..	..	..	..	..	..	..	1	...
New Canaan,	..	1	..	..	..	..	..	..	..	..	1	....
New Fairfield,	..	2	..	..	..	2	..	..	..	..	4	...
Newtown,	6	..	..	..	1	3	..	1	1	..	8	4
Norwalk,	1	1	..	1	..	6	..	..	..	.	4	5
Redding,	3	..	..	..	..	..	..	..	..	..	3	....
Ridgefield,	3	1	1	1	..	1	..	..	..	..	4	3
Sherman,	1	2	..	..	..	1	..	..	..	..	2	2
Stamford,	6	4	..	1	..	..	..	4	..	..	7	8
Stratford,'	1	1	..	..	..	1	1	..	1	1	2	4
Trumbull,	..	2	..	..	..	..	..	1	..	..	1	2
Weston,	2	1	..	..	1	..	..	..	..	..	....	4
Westport,	1	3	..	..	..	1	2	4	..	..	8	3
Wilton,	1	..	.	2	..	1	2	..	2	..	4	4
Total,	51	49	4	6	2	44	18	37	9	1	116	104

Towns in Fairfield Co.	Orders 2 and 3. Heart Disease.	Embolism.	Pericarditis.	Aneurism.	Total. M.	Total. F.	Lung Disease.	Capillary Bronchitis.	Bronchitis.	Pneumonia.	Pleurisy.	Laryngitis.	Asthma.	Total. M.	Total. F.
Danbury,	8	..	..	..	5	3	..	....	2	11	..	..	1	5	9
Bridgeport,	18	1	2	..	11	10	6	....	13	24	1	..	2	28	18
Bethel,	6	..	..	.	4	2	2	....	..	2	..	..	..	2	2
Brookfield,	2	..	..	..	2	..	..	....	1	2	..	..	..	2	1
Darien,	....	..	..	..	..	..	..	....	..	1	..	..	..	....	1
Easton,	2	.	..	..	..	2	..	....	..	1	..	..	..	1	....
Fairfield,	11	..	..	..	3	8	..	....	1	5	..	..	..	3	3
Greenwich,	3	..	..	..	..	3	..	....	1	5	.	..	..	2	4
Huntington,	2	..	..	..	1	1	1	....	2	9	..	..	..	6	6
Monroe,	2	..	..	1	2	1	..	....	..	1	..	.	..	1	....
New Canaan,	2	..	..	..	..	2	..	....	..	7	1	..	1	5	4
New Fairfield,	....	1	..	..	1	..	..	....	..	1	..	..	..	....	1
Newtown,	6	..	..	..	3	3	..	...	2	3	..	..	..	4	1
Norwalk,	9	..	..	..	6	3	..	....	2	17	..	2	..	16	5
Redding,	....	..	..	..	..	..	..	....	1	2	..	..	1	2	2
Ridgefield,	2	..	..	..	1	1	1	....	..	3	..	..	..	2	2
Sherman,	....	..	..	..	..	..	..	....	..	5	..	..	..	3	2
Stamford,	12	..	..	..	5	7	..	....	..	22	..	..	..	12	10
Stratford,'	1	..	1	..	1	1	..	....	3	2	..	..	..	5	....
Trumbull,	1	.	..	..	1	..	1	....	..	....	..	..	..	....	1
Weston,	....	..	..	.	..	..	..	....	..	....	1	..	..	1	....
Westport,	2	..	..		1	1	..	....	..	9	..	..	1	6	4
Wilton,	1	..	1	..	2	.	1	....	1	8	..	..	..	3	7
Total,	90	2	4	1	49	48	12	....	29	140	3	2	6	109	83

CLASS III.—LOCAL DISEASES—Continued.

Towns in Fairfield Co.	Order 4.—Digestive Organs																	Order 5.—Urinary Organs												Order 6.—Generative Organs					Order 8.—Integumentary System							Total for Class III.			
	Gastritis.	Enteritis.	Peritonitis.	Ascites.	Ulceration of Intestines.	Hernia.	Intussusception.	Stricture Intestines.	Stomach Disease.	Colic.	Hepatitis.	Jaundice.	Liver Disease.	Fistula.	Male.	Female.	Total.	Disease of Spleen.	Nephritis.	Bright's Disease.	Diabetes.	Calculus.	Cystitis.	Kidney Disease.	Uremia.	Prostatitis.	Male.	Female.	Total.	Ovarian Tumor.	Ovarian Disease.	Uterine Tumor.	Disease of Uterus.	Total.	Ulcer.	Phlegmon.	Joint Disease.	Disease of Skin.	Tumor.	Male.	Female.	Males.	Females.	Sex not stated.	Total.
Danbury,	..	1	4	..	..	..	1	..	..	..	..	1	3	..	5	5	10	..	..	2	..	1	..	..	..	1	3	1	4	..	..	..	..	..	..	..	..	..	..	..	..	23	29	1	53
Bridgeport,	5	2	6	..	1	1	1	..	3	2	..	2	..	..	12	11	23	..	..	8	..	..	1	..	2	..	6	5	11	1	..	..	1	2	..	2	..	..	..	2	..	94	76	..	170
Bethel,	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	1	..	..	1	..	..	..	..	..	..	..	1	1	..	1	..	..	1	..	1	..	..	1	..	2	15	10	..	25
Brookfield,	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8	4	..	12
Darien,	..	..	1	..	..	..	..	1	1	..	2	1	..	..	2	4	6	..	..	1	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	4	9	..	13
Easton,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	1	1	..	..	..	1	..	..	..	..	..	..	..	2	4	..	6
Fairfield,	..	1	..	..	..	..	..	..	..	..	..	..	1	..	2	..	2	..	..	1	1	..	..	..	..	..	1	1	2	..	..	..	..	..	..	..	..	..	..	..	..	14	16	..	30
Greenwich,	1	1	3	..	..	..	..	..	2	..	..	..	1	..	3	5	8	..	..	2	..	..	..	1	..	..	3	..	3	..	..	..	..	..	..	..	..	..	..	..	..	13	19	..	32
Huntington,	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	1	..	..	..	1	..	1	1	..	..	..	1	..	..	..	..	..	..	..	12	13	..	25
Monroe,	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5	1	..	6
New Canaan,	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	2	2	..	..	1	..	..	1	..	..	..	2	..	2	1	..	..	..	1	..	..	..	..	..	..	..	8	9	..	17
New Fairfield,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	6	1	..	7
Newtown,	..	2	..	..	..	..	..	..	..	..	..	..	1	..	2	1	3	..	..	..	..	..	..	1	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	17	10	..	27
Norwalk,	3	3	1	..	..	..	..	..	1	..	..	..	..	..	4	4	8	..	..	6	..	..	..	2	..	..	6	2	8	..	..	..	1	1	..	..	..	..	..	..	..	36	20	..	56
Redding,	1	..	1	..	..	..	..	..	..	..	..	..	..	..	2	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	7	2	..	9
Ridgefield,	1	1	..	..	..	1	..	..	1	..	1	..	..	..	4	1	5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11	7	..	18
Sherman,	..	..	..	..	..	..	..	1	1	..	..	..	..	..	1	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6	5	..	11
Stamford,	..	..	4	..	..	..	..	..	2	..	1	..	1	..	3	5	8	..	..	..	..	..	..	1	2	..	3	..	3	..	..	..	..	..	..	2	..	..	1	..	3	30	33	..	63
Stratford,	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8	7	..	15
Trumbull,	..	..	1	..	..	1	..	..	..	..	..	..	..	..	1	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	4	..	7
Weston,	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	4	..	6
Westport,	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	2	2	..	..	..	1	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	15	11	..	26
Wilton,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	9	11	..	20
Total,	14	12	23	..	1	3	2	2	11	2	6	5	9	..	45	45	90	..	..	22	2	1	3	7	4	1	28	12	40	5	1	..	2	8	..	5	..	..	2	2	5	348	305	1	654

CLASS IV.—DEVELOPMENTAL DISEASES.

Towns in Fairfield Co.	Order 1.—Of Children. Stillborn.	Premature Birth.	Cyanosis.	Spina Bifida.	Malformations.	Teething.	Total. M.	Total. F.	Orders 2, 3, and 4. Childbirth.	Old Age. M.	Old Age. F.	Atrophy and Debility. M.	Atrophy and Debility. F.	Total for Class IV. Male.	Female.	Not stated.	Total.
Danbury,	2	2					1			3	7			4	7	3	14
Bridgeport,	17	12	2	1	2	1	16	18	1	1	10	15	14	32	43	1	76
Bethel,	6						3	3	1	1	2			4	6		10
Brookfield,										1	1			1	1		2
Darien,		3					2	1			3		3	2	7		9
Easton,			1					1		1	1			1	2		3
Fairfield,	4	2	1		1		6			1	1		1	9	2	2	13
Greenwich,	1		1		1		2	1		1	4		2	3	7		10
Huntington,	3	1					2	2		1				3	2		5
Monroe,	1						1			1				2			2
New Canaan,										1	2	1		2	2		4
New Fairfield,	2									1	3			1	3	2	6
Newtown,	5						2	3			4		5	2	12		14
Norwalk,	11						7	4		5	5			12	9		21
Redding,	2						2				2			2	2		4
Ridgefield,										2	5	1		3	5		8
Sherman,	1						1		1	1				2	1		3
Stamford,						1	1		1	5	9	2	2	8	12		20
Stratford,										2				2			2
Trumbull,		2	1				2	1				2		4	1		5
Weston,		1					1							1			1
Westport,	1	2					2	1		1	6			3	7		10
Wilton,		2						2		1		1		2	2		4
Total,	66	27	6	1	4	2	61	37	4	30	65	22	27	105	133	8	246

CLASS V.—VIOLENT DEATHS.

Towns in Fairfield Co.	Order 1.—Accident and Negligence. Railroad Accidents.	Fractures.	Wounds.	Burns and Scalds.	Poison.	Drowning.	Suffocation.	Otherwise.	Total. M.	Total. F.	Orders 3, 4, and 5. Execution. M.	Suicide. M.	Suicide. F.	Violent, not Classed. M.	Violent, not Classed. F.	Cause not Reported. M.	Cause not Reported. F.	Total for Class V. Male.	Female.	Not stated.	Total.
Danbury,		2				3		2	5	2		2				17	27	24	29	6	59
Bridgeport,		16	5	1	3	5		3	30	3	1		1	2	1	37	20	70	25		95
Bethel,	1	1							1	1								1	1		2
Brookfield,		1	1						2					1				3			3
Darien,	2	2							4									4			4
Easton,		1							1									1			1
Fairfield,																				1	1
Greenwich,							1	2	3								1	3	1		4
Huntington,						1				1									1		1
Monroe,																	1		1		1
New Canaan,		3						1	1	3					1		1	1	4		5
New Fairfield,																					
Newtown,						1			1					3		3	3	6	3	1	10
Norwalk,		2				5			6	1				5	1	33	19	44	21	7	72
Redding,																2	1	2	1		3
Ridgefield,																2		2			2
Sherman,																1	1	1	1		2
Stamford,	1			2		1			3	1				2	1	3	9	8	11		19
Stratford,																					
Trumbull,																2	1	2	1		3
Weston,																					
Westport,		1		1					2			2		2		3	4	7	6		13
Wilton,																					
Total,	4	29	6	4	3	16	1	8	59	12	1	4	1	15	4	103	88	179	106	15	300

GRAND TOTAL FOR ALL CLASSES.

Towns in Fairfield Co.	Males.	Females.	Not stated.	Total.
Danbury,	81	97	12	190
Bridgeport,	306	261	1	568
Bethel,	32	27		59
Brookfield,	13	8		21
Darien,	15	21		36
Easton,	7	6		13
Fairfield,	33	24	3	60
Greenwich,	32	49		81
Huntington,	23	24		47
Monroe,	8	5		13
New Canaan,	24	21		45
New Fairfield,	12	6	2	20
Newtown,	34	35	1	70
Norwalk,	129	90	7	226
Redding,	14	9		23
Ridgefield,	18	16		34
Sherman,	9	10		19
Stamford,	81	89		170
Stratford,	13	12		25
Trumbull,	15	6		21
Weston,	4	7		11
Westport,	32	32		64
Wilton,	18	20		38
Total,	953	875	26	1854

CLASS I.—ZYMOTIC DISEASES.

Towns in Windham Co.	Order I.—Miasmatic.																					Order II.—Enthetic.							Order III.—Dietic.					Total for Class I.		
	Small-pox.	Measles.	Scarlet Fever.	Diphtheria.	Croup.	Whooping Cough.	Typhoid Fever.	Erysipelas.	Puerperal Fever.	Carbuncle.	Dysentery.	Diarrhœa.	Cholera Infantum.	Malarial Fever.	Intermittent Fever.	Congestive Fever.	Typho-Malarial Fever.	Remittent Fever.	Rheumatism.	Cerebro-Spinal Meningitis.	Total. M.	Total. F.	Septicæmia.	Syphilis.	Hydrophobia.	Thrush.	Exophthalmic Goitre.	Total. M.	Total. F.	Privation and Neglect.	Purpura and Scurvy.	Alcoholism.	Total. M.	Total. F.	Male.	Female.	Total.
Brooklyn,			1			1	2		2			3	3							2	4	10													4	10	14
Ashford,							1															1														1	1
Canterbury,																																					
Chaplin,											1											1														1	1
Eastford,				1			1															2														2	2
Hampton,									1				1								1	1													1	1	2
Killingly,		1	3		2	3	13		1		1	2	8								11	23	1					1				1	1		13	23	36
Plainfield,			1		2		3				3		3			2	1			2	8	9													8	9	17
Pomfret,							2				1										1	2													1	2	3
Putnam,				8	6	3	7		1			3	8						1	1	20	18										1	1		21	18	39
Scotland,																				1	1														1		1
Sterling,											1											1														1	1
Thompson,		1		17	5						1	1	13				4		1		21	22													21	22	43
Voluntown,					1								2							1	1	3													1	3	4
Windham,		1		4			3	1	1				12		1	1	7		1	1	16	17													16	17	33
Woodstock,					1		2				2		1								1	5													1	5	6
Total,	..	3	5	30	17	7	34	1	6	..	10	9	51	..	1	3	12	..	3	8	85	115	1	..	..	..	..	1	..	..	..	2	2	.	88	115	203

Towns in Windham Co.	CLASS II.—CONSTITUTIONAL DISEASES. Order 1.—Diathetic. Gout.	Dropsy and Anæmia.	Cancer.	Mortification.	Total. M.	Total. F.	Order 2.—Tubercular. Scrofula.	Tabes Mesenterica.	Phthisis.	Hydrocephalus.	Total. M.	Total. F.	Total for Class II. Male.	Female.	Total.
Brooklyn,		1				1			4		1	3	1	4	5
Ashford,															
Canterbury,			1	1	2				3		2	1	4	1	5
Chaplin,									1		1		1		1
Eastford,									1		1		1		1
Hampton,							2		1		1	2	1	2	3
Killingly,		4	4		4	4	3	2	15	1	8	13	12	17	29
Plainfield,							1		15		8	8	8	8	16
Pomfret,									1		1		1		1
Putnam,		1	1	1	1	2	1		12		6	7	7	9	16
Scotland,		1	2			3			1			1		4	4
Sterling,			1		1				1		1		2		2
Thompson,		1	2		2	1			10	2	6	6	8	7	15
Voluntown,			2		1	1	1		3		2	2	3	3	6
Windham,		1	1		1	1	1		22	1	13	11	14	12	26
Woodstock,									4		1	3	1	3	4
Total,	..	9	14	2	12	13	9	2	94	4	52	57	64	70	134

Towns in Windham Co.	CLASS III.—LOCAL DISEASES. Order 1.—Nervous System. Apoplexy.	Paralysis.	Insanity.	Chorea	Epilepsy.	Convulsions.	Meningitis.	Brain Disease.	Neuralgia.	Spinal Disease.	Total. M.	Total. F.
Brooklyn,		1						4				5
Ashford,		3						1			1	3
Canterbury,		1									1	
Chaplin,		1										1
Eastford,		3						1				4
Hampton,							1	1				2
Killingly,	4	3	1	1		1	2				6	6
Plainfield,	7					1		4		1	9	4
Pomfret,		1	1				2	1			3	2
Putnam,	2	5				1	3	1			5	7
Scotland,	1											1
Sterling,		1						1			1	1
Thompson,		3				1	1	7			8	4
Voluntown,												
Windham,	2	10	1			6		1			11	9
Woodstock,		1			1			2			2	2
Total,	16	33	3	1	1	10	9	24	..	1	47	51

Towns in Windham Co.	Orders 2 and 3. Embolism.	Heart Disease.	Aneurism.	Pericarditis.	Phlebitis	Total. M.	Total. F.	Capillary Bronchitis.	Lung Disease.	Pleurisy.	Bronchitis.	Pneumonia.	Laryngitis.	Asthma.	Total. M.	Total. F.
Brooklyn,									1	1		3		1	3	3
Ashford,												1				1
Canterbury,		5		1		2	4					4			2	2
Chaplin,											1	1				2
Eastford,									1	1					2	
Hampton,												2			2	
Killingly,		12				6	6					10			4	6
Plainfield,		2		1		1	2				1	1		1	1	2
Pomfret,		1				1			1			9			5	5
Putnam,		5		2	1	4	4		1		2	5		1	6	3
Scotland,							1					2				2
Sterling,		1					1									
Thompson,		2				1	1		1		3	2	1		2	5
Voluntown,		3				2	1									
Windham,		6				5	1					6		1	5	2
Woodstock,		1					1				1	1			1	1
Total,	..	39	..	4	1	22	22	....	5	2	8	47	1	4	33	34

CLASS III.—LOCAL DISEASES—Continued.

Towns in Windham Co.	Order 4.—Digestive Organs.																
	Gastritis.	Enteritis.	Peritonitis.	Ascites.	Ulceration of Intestines.	Intussusception.	Hernia.	Stricture Intestines.	Stomach Disease.	Colic.	Hepatitis.	Jaundice.	Liver Disease.	Fistula.	Male.	Female.	Total.
Brooklyn,	..	..	..	..	..	..	..	..	2	..	..	..	..	..	2	..	2
Ashford,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Canterbury,	1	..	..	..	..	..	..	..	..	..	..	..	1	..	1	1	2
Chaplin,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Eastford,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Hampton,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Killingly,	..	..	3	..	..	..	..	..	..	..	..	..	2	..	4	1	5
Plainfield,	..	..	3	..	..	..	..	..	1	..	..	..	..	..	2	2	4
Pomfret,	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	1	1
Putnam,	..	3	2	..	..	..	..	1	..	..	..	1	..	..	3	4	7
Scotland,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Sterling,	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	1
Thompson,	..	..	1	..	2	..	..	1	..	..	..	1	1	..	5	1	6
Voluntown,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Windham,	1	..	..	..	..	..	..	..	..	..	..	..	2	..	3	..	3
Woodstock,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total,	2	3	10	..	2	..	..	2	3	..	..	2	7	..	21	10	31

Towns in Windham Co.	Order 5.—Urinary Organs.											
	Disease of Spleen.	Bright's Disease.	Nephritis.	Diabetes.	Calculus.	Cystitis.	Kidney Disease.	Prostatitis.	Uraemia.	Male.	Female.	Total.
Brooklyn,	..	..	..	..	..	..	..	..	..	..	..	..
Ashford,	..	..	..	..	..	..	..	..	..	..	..	..
Canterbury,	..	..	..	..	..	..	..	..	..	..	..	..
Chaplin,	..	..	..	..	..	..	..	..	..	..	..	..
Eastford,	..	..	..	..	..	..	..	..	..	..	..	..
Hampton,	..	..	..	..	..	..	..	..	..	..	..	..
Killingly,	..	..	..	..	..	..	..	..	..	..	..	..
Plainfield,	..	..	..	..	..	..	..	..	..	..	..	..
Pomfret,	..	1	..	..	..	..	1	..	..	1	1	2
Putnam,	..	..	..	..	..	..	2	..	..	2	..	2
Scotland,	..	..	..	..	..	..	..	..	..	..	..	..
Sterling,	..	..	..	..	..	..	..	..	..	..	..	..
Thompson,	..	1	..	1	..	..	2	..	1	3	2	5
Voluntown,	..	..	..	..	..	..	..	..	..	..	..	..
Windham,	..	..	..	..	..	..	1	..	..	1	..	1
Woodstock,	..	..	..	1	..	..	..	..	..	1	..	1
Total,	..	2	..	2	..	..	6	..	1	8	3	11

Towns in Windham Co.	Order 6.—Generative Organs.					Order 8.—Integumentary System.							Total for Class III.		
	Ovarian Tumor.	Ovarian Dropsy.	Uterine Tumor.	Disease of Uterus.	Total.	Ulcer.	Joint Disease.	Phlegmon.	Tumor.	Disease of Skin.	Male.	Female.	Males.	Females.	Total.
Brooklyn,	..	..	..	..	..	..	..	..	..	..	..	..	5	8	13
Ashford,	..	..	..	..	..	..	..	..	..	..	..	..	1	4	5
Canterbury,	..	..	..	..	..	..	..	..	..	..	..	..	6	7	13
Chaplin,	..	..	..	..	..	..	..	..	..	..	..	..	....	3	3
Eastford,	..	..	..	..	..	..	..	..	..	..	..	..	2	4	6
Hampton,	..	..	..	..	..	..	..	..	..	..	..	..	2	2	4
Killingly,	..	..	..	..	..	..	..	..	..	..	..	..	20	19	39
Plainfield,	..	1	..	..	1	..	1	..	1	..	1	1	14	11	25
Pomfret,	1	..	..	..	1	..	..	..	..	..	..	..	10	10	20
Putnam,	..	..	..	..	..	..	..	..	1	..	..	1	20	19	39
Scotland,	..	..	..	..	..	..	..	..	..	..	..	..	....	3	3
Sterling,	..	..	..	..	..	..	..	..	..	..	..	..	2	2	4
Thompson,	..	..	..	..	..	..	..	..	1	..	1	..	19	13	32
Voluntown,	..	..	..	..	..	..	..	1	..	..	1	..	3	1	4
Windham,	..	..	..	..	..	..	..	2	..	..	1	1	26	13	39
Woodstock,	..	..	..	1	1	..	..	..	..	..	..	..	4	5	9
Total,	1	1	..	1	3	..	1	3	3	..	4	3	134	124	258

Towns in Windham Co.	Class IV.—Developmental Diseases. Order 1.—Of Children. Stillborn.	Premature Birth.	Cyanosis.	Spina Bifida.	Malformations.	Teething.	Total. M.	Total. F.	Orders 2, 3, and 4. Childbirth.	Old Age. M.	Old Age. F.	Atrophy and Debility. M.	Atrophy and Debility. F.	Total for Class IV. Male.	Total for Class IV. Female.	Total for Class IV. Sex not stated.	Total for Class IV. Total.	Class V.—Violent Deaths. Order 1.—Accident and Negligence. Railroad Accidents.	Fractures.	Wounds.	Burns and Scalds.	Poison.	Drowning.	Suffocation.	Otherwise.	Total. M.	Total. F.	Orders 3, 4, and 5. Homicide. M.	Suicide. M.	Suicide. F.	Violent not Classed Casualty. M.	Violent not Classed Casualty. F.	Cause not Reported. M.	Cause not Reported. F.	Total for Class V. Male.	Total for Class V. Female.	Total for Class V. Total.	Grand Total for All Classes. Male.	Grand Total for All Classes. Female.	Grand Total for All Classes. Sex not stated.	Grand Total for All Classes. Total.
Brooklyn,	1	1				1	2	1		1	2			3	3		6																					13	25		38
Ashford,	2						1	1			2			1	3		4						1			1									1		1	8	3		11
Canterbury,		1						1		1	2			1	3		4																					9	13		22
Chaplin,						1	1			1				2			2				1					1									1		1	4	4		8
Eastford,																																						3	6		9
Hampton,	1				1		2							2			2		1								1						1		1	1	2	7	6		13
Killingly,	8	6	1				11	3		3	3			14	6	1	21		3	1		1			1	5	1						2		7	1	8	66	66	1	133
Plainfield,	1	9					5	5						5	5		10						1			1						1	1	2	2	3	5	36	37		73
Pomfret,	1							1	1		1				3		3		1								1									1	1	12	16		28
Putnam,	1					2	1	2		2	3	1	1	4	6		10		1				1			2					2	1	5	9	9	10	19	61	62		123
Scotland,										1		1		2			2		1								1									1	1	3	9		12
Sterling,											1				1		1																					4	4		8
Thompson,		2				1	1	2	1	3			1	4	4		8		4							3	1		1				10	5	14	6	20	66	52		118
Voluntown,		2					1	1		1	3			2	4		6			1						1									1		1	10	11		21
Windham,	1	2				1	3	1	1	2	1	3	2	8	5		13		2		1				1	3	1				1		34	21	38	22	60	102	68		170
Woodstock,										1	1		1	1	2		3				1						1		1					1	1	2	3	8	17		25
Total,	16	23	1		1	6	28	18	3	16	19	5	5	49	45	1	95		13	2	3	1	3		2	17	7		2		3	2	53	38	75	47	122	412	399	1	812

CLASS 1.—ZYMOTIC DISEASES.

Towns in Litchfield Co.	Order I.—Miasmatic.																							Order II.—Enthetic.								Order III.—Dietic.					Total for Class I.			
	Small-pox.	Measles.	Scarlet Fever.	Diphtheria.	Quinsy.	Croup.	Whooping Cough.	Typhoid Fever.	Erysipelas.	Puerperal Fever.	Carbuncle.	Dysentery.	Diarrhea.	Cholera Infantum.	Malarial Fever.	Intermittent Fever.	Congestive Fever.	Typho-Malarial Fever.	Remittent Fever.	Rheumatism.	Cerebro-Spinal Meningitis.	Total. M.	Total. F.	Septicaemia.	Syphilis.	Malignant Pustule.	Thrush.	Worms.	Hydrophobia.	Total. M.	Total. F.	Purpura and Scurvy.	Alcoholism.	Privation and Neglect.	Total. M.	Total. F.	Male.	Female.	Sex not stated.	Total.
Litchfield,													2	1								2	1														2	1		3
Barkhamsted,																																								
Bethlehem,										1													1															1		1
Bridgewater,								3									1						4															4		4
Canaan,																																								
Colebrook,																																								
Cornwall,						1								2								1	2														1	2		3
Goshen,																																								
Harwinton,																																								
Kent,								1							1	2						1	3														1	3		4
Morris,																																								
New Hartford,								1						2			1				1	1	4														1	4		5
New Milford,				2		1		5	1	1				4		1		2				11	6	1							1						11	7		18
Norfolk,												2											2															2		2
North Canaan,				1				1						1								3															3			3
Plymouth,								1	1					1								2	1										1		1		3	1		4
Roxbury,												1	1									1	1														1	1		2
Salisbury,								3	2					1							2	4	4	1							1						4	5		9
Sharon,								2										1			1	3	1														3	1		4
Thomaston,				1			1			2				5				1				5	5														5	5		10
Torrington,						1						1		3							1	4	2										1			1	4	3		7
Warren,																																								
Washington,																																								
Waterbury,		1		1									1	1								2	2														2	2		4
Winchester,		1				1		3						5				1		1		2	10														2	10		12
Woodbury,								1		2				1								1	3										1		1		2	3		5
Total,	..	2	..	5	..	4	1	21	4	6	..	4	4	27	1	3	2	5	..	1	5	43	52	2	..	..	..	..	..	..	2	..	3	..	2	1	45	55	..	100

Towns in Litchfield Co.	CLASS II.—CONSTITUTIONAL DISEASES. Order 1.—Diathetic. Dropsy and Anæmia.	Cancer.	Mortification.	Total. M.	Total. F.	Order 2.—Tubercular. Scrofula.	Tabes Mesenterica.	Phthisis.	Hydrocephalus.	Total. M.	Total. F.	Total for Class II. Male.	Female.	Total.
LITCHFIELD,	1	..	1	..	2	..	....	8	..	3	5	3	7	10
Barkhamsted,	....	1	..	1	..	..	....	1	..	....	1	1	1	2
Bethlehem,	....	..	..	..	..	..	....	3	..	2	1	2	1	3
Bridgewater,	....	..	..	..	..	..	....	1		...	1	....	1	1
Canaan,	....	2	2	3	1	..	....	....	..	....	...	3	1	4
Colebrook,	1	..	..	1	..	..	....	....	..	....	...	1	....	1
Cornwall,	....	..	..	..	..	..	....	2	.	1	1	1	1	2
Goshen,	....	1	..	..	1	..	....	....	..	....	....	....	1	1
Harwinton,	....	..	..	..	..	..	....	2	..	2	.	2	....	2
Kent,	....	..	..	..	..	..	....	3	..	1	2	1	2	3
Morris,	....	..	..	..	..	1	....	1	.	....	2	....	2	2
New Hartford,	3	1	..	2	2	..	1	7	..	6	2	8	4	12
New Milford,	3	3	1	4	3	..	....	11	..	5	6	9	9	18
Norfolk,	1	..	..	..	1	..	....	6	..	3	3	3	4	7
North Canaan,	....	..	..	..	..		....	....	..	....	....	....	....	....
Plymouth,	1	..	..	1	..	..	....	10	..	7	3	8	3	11
Roxbury,	1	..	1	1	1	..	...	2	..	1	1	2	2	4
Salisbury,	....	..	1	..	1	..	1	6	..	2	5	2	6	8
Sharon,	....	..	..	..	..	1	....	4	..	2	3	2	3	5
Thomaston,	....	..	..	..	..	1	....	3	1	3	2	3	2	5
Torrington,	1	2	..	2	1	..	..	3	1	....	4	2	5	7
Warren,	....	..	..	..	..	..	....	1		....	1	....	1	1
Washington,	....	..	..	..	..	..	....	1	..	1	....	1	....	1
Watertown,	2	1	..	..	3	..	....	6	..	2	4	2	7	9
Winchester,	....	2	2	2	2	1	....	16	2	13	6	15	8	23
Woodbury,	....	1	..	1	..	..	....	3	..	1	2	2	2	4
Total,	14	14	8	18	18	4	2	100	4	55	55	73	73	146

Towns in Litchfield Co.	CLASS III.—LOCAL DISEASES. Order 1.—Nervous System. Apoplexy.	Paralysis.	Insanity.	Epilepsy.	Tetanus.	Convulsions.	Meningitis.	Brain Disease.	Spinal Disease.	Neuralgia.	Total. M.	Total. F.
LITCHFIELD,	1	..	2	..	..	1	2	..	..	..	4	2
Barkhamsted,	1	1	..	..	..	..	..	1	..	..	2	1
Bethlehem,	..	..	..	..	..	..	..	..	..	1	....	1
Bridgewater,	..	1	..	..	..	1	1	..	..	..	2	1
Canaan,	..	2	..	..	..	..	..	..	..	..	...	2
Colebrook,	..	..	..	..	..	..	..	..	..	..	....	....
Cornwall,	..	1	..	..	1	1	..	..	..	..	2	1
Goshen,	..	.	..	..	..	1	..	..	..	..	1	....
Harwinton,	.	..	..	..	..	1	..	2	..	..	....	3
Kent,	1	..	1	1	..	1	..	..	..	..	3	1
Morris,	..	1	..	..	..	..	..	..	..	..	1	....
New Hartford,	..	..	..	..	..	1	..	1	..	..	1	1
New Milford,	2	2	..	..	..	1	..	2	..	..	4	3
Norfolk,	1	3	..	..	..	1	..	..	..	..	4	1
North Canaan,	..	..	..	..	..	1	..	..	..	.	....	1
Plymouth,	..	..	..	..	..	..	..	..	..	..	....	....
Roxbury,	2	..	..	..	..	..	..	..	..	..	1	1
Salisbury,	1	4	..	1	..	1	2	..	..	..	4	5
Sharon,	..	..	..	..	..	1	.	1	..	..	1	1
Thomaston,	1	..	..	..	..	..	2	1	..	..	1	3
Torrington,	5	..	..	..	..	..	2	1	..	..	5	3
Warren,	1	..	..	..	..	..	..	..	..	..	1	....
Washington,	..	1	..	..	..	1	..	1	..	..	2	1
Watertown,	1	1	..	..	..	1	2	1	..	..	4	2
Winchester,	2	1	..	..	..	2	..	7	..	..	7	5
Woodbury,	6	1	..	1	..	..	3	..	..		7	4
Total,	25	19	3	3	1	16	14	18	..	1	57	43

Towns in Litchfield Co.	Orders 2 and 3. Heart Disease.	Aneurism.	Pericarditis.	Phlebitis.	Total. M.	Total. F.	Lung Disease.	Capillary Bronchitis.	Bronchitis.	Pneumonia.	Pleurisy.	Laryngitis.	Asthma.	Total. M.	Total. F.
LITCHFIELD,	2	..	..	..	1	1	..	1	2	6	..	..	..	3	6
Barkhamsted,	....	..	..	..	..	..	..	....	..	2	..	..	..	1	1
Bethlehem,	1	..	..	..	..	1	..	....	..	....	..	..	..	....	....
Bridgewater,	....	..	..	..	..	..	..	....	..	....	..	..	..	....	....
Canaan,	1	..	..	.	..	1	..	....	..	2	..	..	..	....	2
Colebrook,	....	..	..	..	..	..	1	....	..	....	..	..	..	....	1
Cornwall,	2	1	..	..	2	1	..	....	..	3	..	..	..	1	2
Goshen,	3	..	..	..	2	1	..	....	..	1	..	..	.	1	....
Harwinton,	2	..	..	..	..	2	..	....	..	....	..	..	..	....	....
Kent,	....	..	..	..	..	..	..	....	..	6	..	.	..	3	3
Morris,	....		1	..	1	..	..	....	1	....	..	..	..	1	....
New Hartford,	1	..	..	..	..	1	1	....	..	2	..	..	..	1	2
New Milford,	3	..	..	..	1	2	1	...	1	8	..	..	..	5	5
Norfolk,	....	..	..	..	..	..	..	....	..	4	..	1	..	2	3
North Canaan,	....	..	..	..	..	..	..	....	..	2	..	..	..	....	2
Plymouth,	....	..	..	..	..	..	..	....	1	8	..	..	..	8	1
Roxbury,	1	..	..	..	..	1	1	....	..	1	..	..	..	2	....
Salisbury,	5	..		..	3	2	2	....	..	4	..	..	..	3	3
Sharon,	8	..	..	..	2	6	..	....	..	7	..	..	..	4	3
Thomaston,	1	..	..	..	..	1	..	....	1	4	..	..	..	3	2
Torrington,	1	..	..	..	..	1	..	....	..	6	..	1	..	2	5
Warren,	1	..	1	..	..	2	..	....	..	....	..	..	..	....	....
Washington,	....	..	..	..	..	..	..	....	..	2	..	..	..	....	2
Watertown,	2	..	..	..	1	1	..	....	1	4	..	..	..	1	4
Winchester,	1	1	..	..	1	1	3	....	..	2	..	..	..	2	3
Woodbury,	2	..	..	1	2	1	..	....	..	7	..	..	..	5	2
Total,	37	2	2	1	16	26	9	1	7	81	..	2	..	48	52

F

CLASS III.—LOCAL DISEASES—Continued.

Towns in Litchfield Co.	Order 4.—Digestive Organs.																	Order 5.—Urinary Organs.												Order 6.—Generative Organs.					Order 8.—Integumentary System.							Total for Class III.			
	Gastritis.	Enteritis.	Peritonitis.	Ascites.	Ulceration of Intestines.	Hernia.	Intussusception.	Stricture Intestines.	Stomach Disease.	Colic.	Hepatitis.	Jaundice.	Liver Disease.	Fistula.	Male.	Female.	Total.	Disease of Spleen.	Nephritis.	Bright's Disease.	Diabetes.	Calculus.	Cystitis.	Kidney Disease.	Uremia.	Prostatitis.	Male.	Female.	Total.	Ovarian Dropsy.	Ovarian Tumor.	Uterine Tumor.	Disease of Uterus.	Total.	Ulcer.	Phlegmon.	Joint Disease.	Disease of Skin.	Tumor.	Male.	Female.	Males.	Females.	Sex not stated.	Total.
Litchfield,		1				1									2		2																									10	9		19
Barkhamsted,													1		1		1																									4	2		6
Bethlehem,																																											2		2
Bridgewater,									1						1		1																									3	1		4
Canaan,																																											5		5
Co'ebrook,																																											1		1
Cornwall,																																										5	4		9
Goshen,			1												1		1																									5	1		6
Harwinton,													1		1		1																									1	5		6
Kent,																			1								1		1													7	4		11
Morris,																																										3			3
New Hartford,																				1							1		1				1	1								3	5		8
New Milford,			1							1						2	2						1				1		1		2	1		3								11	15		26
Norfolk,																																										6	4		10
North Canaan,																				1							1		1													1	3		4
Plymouth,			1						1						2		2																									10	1		11
Roxbury,																								1			1		1													4	2		6
Salisbury,			2												1	1	2		4						1		2	3	5							1					1	13	15		28
Sharon,																																										7	10		17
Thomaston,				1									1		2		2																									6	6		12
Torrington,	1												1		1	1	2			1					1			2	2	1				1								8	13		21
Warren,																																				1					1	1	3		4
Washington,	1															1	1						1		1		2		2		1			1								4	5		9
Watertown,																						1						1	1													6	8		14
Winchester,			2									1			2	1	3			1	1						1	1	2													13	11		24
Woodbury,						1					1					2	2		1	3			1				3	2	5													17	11		28
Total,	2	1	7	1		2			2	1	1	1	4		14	8	22		6	7	1	1	3	1	3		13	9	21	1	3	1	1	6		2					2	148	146		294

Towns in Litchfield Co.	CLASS IV.—DEVELOPMENTAL DISEASES. Order 1.—Of Children. Stillborn.	Premature Birth.	Cyanosis.	Spina Bifida.	Malformations.	Teething.	Total. M.	Total. F.	Orders 2, 3, and 4. Childbirth.	Old Age. M.	Old Age. F.	Atrophy and Debility. M.	Atrophy and Debility. F.	Total for Class IV. Male.	Female.	Not stated.	Total.	CLASS V.—VIOLENT DEATHS. Order 1.—Accident and Negligence. Railroad Accidents.	Fractures.	Wounds.	Burns and Scalds.	Poison.	Drowning.	Suffocation.	Otherwise.	Total. M.	Total. F.	Orders 3, 4, and 5. Homicide. M.	Suicide. M.	Suicide. F.	Violent, not Classed. M.	Violent, not Classed. F.	Cause not Reported. M.	Cause not Reported. F.	Total for Class V. Male.	Female.	Not stated.	Total.	Grand Total for All Classes. Males.	Females.	Not stated.	Total.
LITCHFIELD,	..	..	..	..	..	..	..	..	..	..	2	1	..	1	2	..	3	..	2	..	1	..	..	1	..	3	1	..	..	..	..	..	1	2	4	3	..	7	20	22	..	42
Barkhamsted,	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	1	..	2	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	1	1	..	2	7	4	..	11
Bethlehem,	..	..	..	..	..	..	..	..	..	2	1	..	..	2	1	..	3	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..	1	5	5	..	10
Bridgewater,	1	..	2	..	..	..	1	2	..	1	..	..	..	2	2	..	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5	8	..	13
Canaan,	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	1	3	8	..	11
Colebrook,	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	1	2	2	..	4
Cornwall,	..	1	..	..	..	..	1	1	..	1	1	..	..	2	1	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9	8	..	17
Goshen,	..	..	..	..	..	..	..	..	..	..	3	..	..	..	3	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5	5	..	10
Harwinton,	1	..	..	..	..	..	1	..	..	..	2	..	..	1	2	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	2	..	..	2	6	7	..	13
Kent,	..	1	..	..	..	..	1	..	..	2	1	..	..	3	1	..	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	12	10	.	22
Morris,	..	..	..	..	..	..	..	..	..	1	1	..	..	1	1	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	3	.	7
New Hartford,	..	1	1	1	..	..	2	1	..	..	..	..	..	2	1	..	3	..	..	..	..	1	..	..	..	..	1	..	..	..	..	..	1	2	1	3	..	4	15	17	..	32
New Milford,	3	2	..	..	..	1	3	3	1	1	5	..	..	4	9	..	13	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	2	1	2	.	3	36	42	..	78
Norfolk,	..	..	..	..	..	..	..	..	..	4	5	..	..	4	5	..	9	..	1	..	..	..	..	..	..	..	1	..	..	..	..	..	..	1	..	2	..	2	13	17	..	30
North Canaan,	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1		1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	1	5	4	..	9
Plymouth,	..	..	..	..	..	..	..	..	1	1	..	..	..	1	1	..	2	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..	1	23	6	..	29
Roxbury,	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	1	8	6	..	14
Salisbury,	11	2	..	..	..	..	8	5	..	..	1	..	..	8	6	..	14	..	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	1	28	32	..	60
Sharon,	6	..	..	..	..	..	..	3	..	1	1	..	..	1	4	3	8	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1	1	2	1	..	3	15	19	3	37
Thomaston,	..	1	..	..	..	..	..	1	..	..	..	2	..	2	1	..	3	..	..	..	..	..	2	..	..	2	..	..	..	..	..	..	..	1	2	1	..	3	18	15	..	33
Torrington,	3	.	..	..	..	..	3	..	..	2	4	..	1	5	5	..	10	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	1	..	..	1	20	26	..	46
Warren,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	...	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	1	2	4	..	6
Washington,	1	..	..	..	..	..	1	..	..	..	..	..	..	1	..	..	1	..	..	..	..	..	1	..	..	1	..	..	..	..	..	..	1	..	2	..	..	2	8	5	..	13
Watertown,	2	.	..	..	..	..	1	..	.	2	4	..	..	3	4	1	8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	1	14	21	1	36
Winchester,	..	..	..	..	..	1	1	..	1	..	4	..	..	1	5	..	6	..	..	2	1	1	..	..	..	4	..	..	..	..	..	..	..	..	4	..	..	4	35	34	..	69
Woodbury,	..	..	..	..	..	..	..	..	..	1	..	1	..	2	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	1	24	16	..	40
Total,	28	8	3	1	..	2	23	16	3	22	37	4	1	49	56	4	109	..	6	2	2	2	3	1	..	12	4	1	2	1	1	1	10	11	27	16	..	43	342	346	4	692

CLASS I.—ZYMOTIC DISEASES.

Towns in Middlesex Co.	Order I.—Miasmatic.																					Order II.—Enthetic.							Order III.—Dietic.					Total for Class I.		
	Small-pox.	Measles.	Diphtheria.	Quinsy.	Croup.	Whooping Cough.	Typhoid Fever.	Erysipelas.	Puerperal Fever.	Carbuncle.	Dysentery.	Diarrhea.	Cholera Infantum.	Malarial Fever.	Intermittent Fever.	Congestive Fever.	Typho-Malarial Fever.	Remittent Fever.	Rheumatism.	Cerebro-Spinal Meningitis.	Total. M.	Total. F.	Pyaemia.	Syphilis.	Hydrophobia.	Thrush.	Exophthalmic Goitre.	Total. M.	Total. F.	Privation and Neglect.	Purpura and Scurvy.	Alcoholism.	Total. M.	Total. F.	Male.	Female.	Total.
Middletown,		4	1	1	6		6	2	1		2	3	7		4		6			3	25	21													25	21	46
Haddam,							2						3				1				2	4													2	4	6
Chatham,			1				2	1			1										1	4													1	4	5
Chester,			1					1													1	1													1	1	2
Clinton,							2						1						1		1	3													1	3	4
Cromwell,						1	1					3							1		2	4										1	1		3	4	7
Durham,																	1				1										1			1	1	1	2
East Haddam,			1				2					1	1		1		2		1		4	5													4	5	9
Essex,												1								1	2														2		2
Killingworth,																			2			2														2	2
Middlefield,																																					
Old Saybrook,						1	1					1	4							1		8														8	8
Portland,		1	2		2	1	2	2	1		2		9		1		2		1		11	15	1					1		1			1		13	15	28
Saybrook,							1		1			1			3						2	4													2	4	6
Westbrook,											1											1														1	1
Total,	..	5	6	1	8	3	19	6	3	..	6	10	25	..	9	..	12	..	6	5	52	72	1	..	..	..	..	1	..	1	1	1	2	1	55	73	128

CLASS II.—CONSTITUTIONAL DISEASES.

Towns in Middlesex Co.	Order 1.—Diathetic.					Order 2.—Tubercular						Total for Class II.		
	Gout.	Dropsy and Anæmia.	Cancer.	Mortification.	Total. M.	Total. F.	Scrofula.	Tabes Mesenterica.	Phthisis.	Hydrocephalus.	Total. M.	Total. F.	Male.	Female.	Total.
Middletown,...	..	....	2	..	..	2	1	5	25	..	16	15	16	17	33
Haddam,........	..	....	2	..	1	1	..	..	3	..	....	3	1	4	5
Chatham,.......	..	....	..	..	..	..	1	..	1	1	2	1	2	1	3
Chester, ...	..	1	..	..	..	1	..	..	2	..	....	2	....	3	3
Clinton, ...	..	....	..	..	..	..	..	1	2	..	1	2	1	2	3
Cromwell,.......	..	....	..	..	..	..	1	..	3	..	4	....	4	....	4
Durham,.........	..	1	..	..	..	1	..	..	....	..	....	....	....	1	1
East Haddam,...	..	....	2	2	3	1	..	..	4	..	3	1	6	2	8
Essex,..........	..	1	1	..	1	1	..	..	2	..	2	....	3	1	4
Killingworth,....	..	....	..	..	..	..	..	..	2	..	....	2	....	2	2
Middlefield,......	..	2	..	1	2	1	1	..	....	1	1	1	3	2	5
Old Saybrook,...	..	....	..	..	..	..	..	..	....	..	....	....	....	....	....
Portland,........	..	3	2	..	3	2	..	1	9	..	6	4	9	6	15
Saybrook,.......	..	1	..	..	..	1	..	..	1	..	....	1	....	2	2
Westbrook,......	..	....	..	..	..	..	..	..	2	..	1	1	1	1	2
Total,......	..	9	9	3	10	11	4	7	56	2	36	33	46	44	90

CLASS III.—LOCAL DISEASES.

Towns in Middlesex Co.	Order 1.—Nervous System.											
	Apoplexy.	Paralysis.	Insanity.	Epilepsy.	Tetanus.	Convulsions.	Meningitis.	Brain Disease.	Spinal Disease.	Neuralgia.	Total. M.	Total. F.
Middletown,...	6	8	15	1	2	2	2	6	..	..	18	24
Haddam,........	3	..	..	..	..	....	..	..	..	1	2	2
Chatham,.......	2		..	..	..	1	1	1	1	..	3	3
Chester, ...	..	..	..	..	..	....	..	1	..	..	1	....
Clinton, ...	1	2	..	..	..	....	..	2	..	..	3	2
Cromwell,.......	..	..	..	..	..	....	..	..	..	..	....	....
Durham,.........	..	1	..	..	..	....	1	1	..	..	....	3
East Haddam,...	1	1	1	..	1	1	..	1	..	..	4	2
Essex,..........	2	2	..	..	..	1	..	1	..	..	3	3
Killingworth,....	1	4	..	..	..	....	..	..	..	..	2	3
Middlefield,......	1	..	..	..	..	....	..	..	..	..	1	....
Old Saybrook,...	1	..	..	..	1	2	..	1	..	..	3	2
Portland,........	1	3	..	..	..	....	..	4	..	..	3	5
Saybrook,.......	1	1	..	..	..	....	..	..	..	..	1	1
Westbrook,......	1	1	..	..	1	....	..	..	..	..	3	....
Total,......	21	23	16	1	5	7	4	18	1	1	47	50

Towns in Middlesex Co.	Orders 2 and 3															
	Embolism.	Heart Disease.	Aneurism.	Pericarditis.	Phlebitis.	Total. M.	Total. F.	Capillary Bronchitis.	Lung Disease.	Bronchitis.	Pleurisy.	Pneumonia.	Laryngitis.	Asthma.	Total. M.	Total. F.
Middletown,...	..	9	..	..	..	3	6	....	1	7	2	9	..	2	14	7
Haddam,........	..	....	..		..	..	..	....	1	..	..	2	..	..	2	1
Chatham,.......	..	....	..	..	..	..	..	....	..	..	..	1	1	..	1	1
Chester, ...	..	....	..	..	..	..	..	....	..	..	..	1	..	..	1	....
Clinton, ...	..	....	..	..	..	..	..	....	1	..	..	3	..	..	1	3
Cromwell,.......	..	1	..	..	..	..	1	....	1	..	..	....	..	..	....	1
Durham,.........	..	....	..	..	..	..	..	....	..	..	..	1	..	..	....	1
East Haddam,...	..	4	1	..	..	..	5	....	..	..	..	2	..	..	....	2
Essex,..........	..	1	..	..	..	..	1	....	..	1	..	1	..	..	1	1
Killingworth,....	..	....	..	..	..	..	..	....	..	..	..	....	..	..	....	....
Middlefield,......	..	..	..	..	..	..	..	....	..	..	..	....	..	..	....	....
Old Saybrook,...	..	....	..	..	..	..	..	....	1	..	..	4	..	..	2	3
Portland,........	..	7	..	..	..	6	1	....	1	..	..	4	..	..	3	2
Saybrook,.......	..	2	..	..	..	1	1	....	..	..	..	....	..	..	....	....
Westbrook,......	..	....	..	..	..	..	..	....	..	..	..	....	..	..	....	....
Total,......	..	24	1	..	..	10	15	....	6	8	2	28	1	2	25	22

CLASS III.—LOCAL DISEASES—Continued

Towns in Middlesex Co.	Order 4.—Digestive Organs. Gastritis.	Enteritis.	Peritonitis.	Ascites.	Ulceration of Intestines.	Intussusception.	Hernia.	Stricture Intestines.	Stomach Disease.	Colic.	Hepatitis.	Jaundice.	Liver Disease.	Fistula.	Male.	Female.	Total.	Order 5.—Urinary Organs. Disease of Spleen.	Bright's Disease.	Nephritis.	Diabetes.	Calculus.	Cystitis.	Kidney Disease.	Prostatitis.	Uremia.	Male.	Female.	Total.	Order 6.—Generative Organs. Ovarian Tumor.	Ovarian Dropsy.	Disease of Uterus.	Uterine Tumor.	Total.	Order 8.—Integumentary System. Ulcer.	Joint Disease.	Phlegmon.	Tumor.	Disease of Skin.	Male.	Female.	Total for Class III. Males.	Females.	Total.
Middletown,	5	4									1		1		5	6	11		4								3	1	4								1			1		44	44	88
Haddam,							1			1					2		2		1		2						3		3													9	3	12
Chatham,			1													1	1																									4	5	9
Chester,																																										2		2
Clinton,													1			1	1				1						1		1													5	6	11
Cromwell,																			1								1		1								1			1		2	2	4
Durham,		1	1					1							1	2	3																									1	6	7
East Haddam,											1					1	1																1	1								4	11	15
Essex,	2		1												1	2	3		1									1	1				1	1								5	9	14
Killingworth,																																	1	1								2	4	6
Middlefield,																							1				1		1													2		2
Old Saybrook,																			2									2	2													5	7	12
Portland,			2												1	1	2						1				1		1													14	9	23
Saybrook,																																										2	2	4
Westbrook,																																										3		3
Total,	7	5	5				1	1		1	2		2		10	14	24		9		3		2				10	4	14				3	3			2			2		104	108	212

CLASS IV.—DEVELOPMENTAL DISEASES.

Towns in Middlesex Co.	Order 1.—Of Children. Stillborn.	Premature Birth.	Cyanosis.	Spina Bifida.	Malformations.	Teething.	Total. M.	Total. F.	Orders 2, 3, and 4. Childbirth.	Old Age. M.	Old Age. F.	Atrophy and Debility. M.	Atrophy and Debility. F.	Total for Class IV. Male.	Female.	Sex not stated.	Total.
Middletown,	6	4	..	..	2	5	8	8	1	..	6	1	1	9	16	1	26
Haddam,						1	1			1				2			2
Chatham,			1				1			1				2			2
Chester,																	
Clinton,										1	1			1	1		2
Cromwell,		1						1							1		1
Durham,										3				3			3
East Haddam,						1		1		4	1			4	2		6
Essex,				1				1				2	1	2	2		4
Killingworth,										1	3			1	3		4
Middlefield,																	
Old Saybrook,																	
Portland,		3						3			3				6		6
Saybrook,		2					2				1			2	1		3
Westbrook,			1				1			3				4			4
Total,	6	10	2	1	2	7	13	14	1	14	15	3	2	30	32	1	63

CLASS V.—VIOLENT DEATHS.

Towns in Middlesex Co.	Order 1.—Accident and Negligence. Railroad Accidents.	Fractures.	Wounds.	Burns and Scalds.	Poison.	Drowning.	Suffocation.	Otherwise.	Total. M.	Total. F.	Orders 3, 4, and 5. Homicide. M	Suicide. M.	Suicide. F.	Violent not Classed Casualty. M.	Violent not Classed Casualty. F.	Cause not Reported. M.	Cause not Reported. F.	Total for Class V. Male.	Female.	Total.
Middletown,		4	..	1	..	1	1	..	4	3	..	1			1	1	..	6	4	10
Haddam,																	1		1	1
Chatham,																				
Chester,																				
Clinton,		1				1	1		2	1							1	2	2	4
Cromwell,																	2		2	2
Durham,																	1		1	1
East Haddam,		1							1				2			2	6	3	8	11
Essex,																				
Killingworth,																				
Middlefield,						2			2									2		2
Old Saybrook,						2			1	1				1	1	1		3	2	5
Portland,		1	2					2	5						2		1	5	3	8
Saybrook,				1						1									1	1
Westbrook,						1			1			1						2		2
Total,	..	7	2	2	..	7	2	2	16	6	..	2	2	1	4	4	12	23	24	47

Grand Total for All Classes.

Towns in Middlesex Co.	Male.	Female.	Sex not stated.	Total.
Middletown,	100	102	1	203
Haddam,	14	12		26
Chatham,	9	10		19
Chester,	3	4		7
Clinton,	10	14		24
Cromwell,	9	9		18
Durham,	5	9		14
East Haddam,	21	28		49
Essex,	12	12		24
Killingworth,	3	11		14
Middlefield,	7	2		9
Old Saybrook,	8	17		25
Portland,	41	39		80
Saybrook,	6	10		16
Westbrook,	10	2		12
Total,	258	281	1	540

CLASS I.—ZYMOTIC DISEASES.

Towns in Tolland Co.	Order I.—Miasmatic.																							Order II.—Enthetic.								Order III.—Dietic.					Total for Class I.			
	Small-pox.	Measles.	Scarlet Fever.	Diphtheria.	Quinsy.	Croup.	Whooping Cough.	Typhoid Fever.	Erysipelas.	Puerperal Fever.	Carbuncle.	Dysentery.	Diarrhea.	Cholera Infantum.	Malarial Fever.	Intermittent Fever.	Congestive Fever.	Typho-Malarial Fever.	Remittent Fever.	Rheumatism.	Cerebro-Spinal Meningitis.	Total. M.	Total. F.	Septicaemia.	Syphilis.	Malignant Pustule.	Thrush.	Worms.	Hydrophobia.	Total. M.	Total. F.	Purpura and Scurvy.	Alcoholism.	Privation and Neglect.	Total. M.	Total. F.	Male.	Female.	Sex not stated.	Total.
Tolland,														1								1															1			1
Andover,							1						1			1				1		2	2														2	2		4
Bolton,																				1			1															1		1
Columbia,													1									1															1			1
Coventry,			1			1		2					1	2								4	3														4	3		7
Ellington,			1											1									2										1					2		2
Hebron,								1	1			1										2	1												1		3	1		4
Mansfield,			1				1	3	1				1	3								5	5														5	5		10
Somers,																																								
Stafford,		3	1	7		2		3	1					3		1		2		1		9	15	1							1						9	16		25
Union,				1		2								1								2	2														2	2		4
Vernon,		5		5		1	1	6	2				2	13							2	17	20				1						1		2		19	20		39
Willington,								3						3								3	3														3	3		6
Total,		8	4	13		6	3	18	5			1	6	27		2		2		3	2	46	54	1			1				1		2		3		49	55		104

Towns in Tolland Co.	CLASS II.—CONSTITUTIONAL DISEASES. Order 1.—Diathetic. Gout.	Dropsy and Anæmia.	Cancer.	Senile Gangrene.	Total. M.	Total. F.	Order 2.—Tubercular. Scrofula.	Tabes Mesenterica.	Phthisis.	Hydrocephalus.	Total. M.	Total. F.	Total for Class II. Male.	Female.	Total.
TOLLAND,	..	....	..	..	..	..	..	..	....	..	....	....	....	....	....
Andover,	..	1	1	..	..	2	..	..	1	..	1	....	1	2	3
Bolton,	..	1	..	..	1	..	..	..	1	..	....	1	1	1	2
Columbia,	..	....	1	..	..	1	..	..	2	..	....	2	....	3	3
Coventry,	..	....	3	..	..	3	1	..	2	..	1	2	1	5	6
Ellington,	..	....	1	..	1	..	..	..	....	..	....	....	1	....	1
Hebron,	..	....	3	..	1	2	..	..	....	..	....	....	1	2	3
Mansfield,	..	....	2	1	3	..	..	..	....	..	....	....	3	....	3
Somers,	..	....	..	..	..	..	..	..	4	..	3	1	3	1	4
Stafford,	..	1	1	..	..	2	..	1	4	..	2	3	2	5	7
Union,	..	....	1	..	..	1	..	..	1	..	1	....	1	1	2
Vernon,	..	....	6	1	4	3	1	3	12	..	9	7	13	10	23
Willington,	..	....	1	..	..	1	..	1	1	1	3	....	3	1	4
Total,	..	3	20	2	10	15	2	5	28	1	20	16	30	31	61

Towns in Tolland Co.	CLASS III.—LOCAL DISEASES. Order 1.—Nervous System. Apoplexy.	Paralysis.	Insanity.	Epilepsy.	Tetanus	Convulsions.	Meningitis.	Brain Disease.	Spinal Disease.	Neuralgia.	Total. M.	Total. F.
TOLLAND,	1	..	..	1	..	..	..	1	..	..	2	1
Andover,	1	..	..	..	..	..	..	..	..	..	..	1
Bolton,	..	..	..	..	..	..	..	..	..	..	..	..
Columbia,	1	1	..	..	..	..	..	..	..	..	..	2
Coventry,	..	1	..	..	..	..	..	..	..	..	1	..
Ellington,	..	..	..	..	1	..	..	..	..	..	1	..
Hebron,	..	..	..	..	..	..	..	..	..	..	..	..
Mansfield,	3	1	..	..	..	..	..	..	..	..	2	2
Somers,	2	..	..	..	..	..	..	..	..	..	1	1
Stafford,	1	..	..	..	..	..	..	3	..	..	2	2
Union,	1	2	..	..	..	..	..	..	..	..	2	1
Vernon,	1	1	1	..	..	..	1	4	..	..	3	5
Willington,	3	..	..	..	..	..	..	..	..	..	1	2
Total,	14	6	1	1	1	..	1	8	..	..	15	17

Towns in Tolland Co.	CLASS III.—LOCAL DISEASES. Orders 2 and 3. Embolism.	Heart Disease.	Aneurism.	Pericarditis.	Phlebitis.	Total. M.	Total. F.	Capillary Bronchitis.	Lung Disease.	Bronchitis.	Pleurisy.	Pneumonia.	Laryngitis.	Asthma.	Total. M.	Total. F.
TOLLAND,	..	....	..	..	..	..	..	....	1	..	..	1	..	..	1	1
Andover,	..	1	..	..	..	..	1	....	..	..	..	....	..	..	....	....
Bolton,	..	2	..	..	..	1	1	....	..	..	..	1	..	..	....	1
Columbia,	..	1	..	..	..	..	1	....	..	..	1	....	..	..	....	1
Coventry,	..	6	..	..	..	3	3	....	..	..	..	3	1	..	3	1
Ellington,	..	1	..	..	..	..	1	....	..	1	..	1	..	..	2	....
Hebron,	..	2	..	..	..	1	1	....	..	..	..	....	..	..	....	....
Mansfield,	..	1	..	..	..	..	1	....	1	2	..	1	..	..	2	2
Somers,	..	....	..	1	..	..	1	....	..	..	..	4	..	..	2	2
Stafford,	..	....	..	..	..	..	..	....	..	1	..	4	..	1	4	2
Union,	..	....	..	..	..	..	..	....	..	..	..	....	..	..	....	....
Vernon,	..	6	..	..	..	5	1	....	..	..	1	5	..	1	5	2
Willington,	..	....	..	..	..	..	..	....	..	..	..	6	..	..	2	4
Total,	..	20	..	1	..	10	11	....	2	4	2	26	1	2	21	16

CLASS III.—LOCAL DISEASES—Continued

Towns in Tolland Co.	Order 4.—Digestive Organs.																	Order 5.—Urinary Organs.												Order 6.—Generative Organs.					Order 8.—Integumentary System.							Total for Class III.		
	Gastritis.	Enteritis.	Peritonitis.	Ascites.	Ulceration of Intestines	Intussusception.	Hernia.	Stricture Intestines.	Stomach Disease.	Colic.	Hepatitis.	Jaundice.	Liver Disease.	Fistula.	Male.	Female.	Total.	Disease of Spleen.	Bright's Disease.	Nephritis.	Diabetes.	Calculus.	Cystitis.	Kidney Disease.	Prostatitis.	Uræmia.	Male.	Female.	Total.	Ovarian Tumor.	Ovarian Dropsy.	Disease of Uterus.	Uterine Tumor.	Total.	Ulcer.	Joint Disease.	Phlegmon.	Tumor.	Disease of Skin.	Male.	Female.	Males.	Females.	Total.
Tolland,					1										1		1		1		1						1	1	2													5	3	8
Andover,																																											2	2
Bolton,																																										1	2	3
Columbia,																																											4	4
Coventry,	1								1						1	1	2						1	1			2		2													10	5	15
Ellington,	1														1		1																									4	1	5
Hebron,			2												1	1	2																									2	2	4
Mansfield,																																										4	5	9
Somers,	2															2	2														1			1								3	7	10
Stafford,		1	3										1		3	2	5																									9	6	15
Union,													1			1	1		1								1		1													3	2	5
Vernon,			1		1						1	1	2		5	1	6		4					1			4	1	5													22	10	32
Willington,																			3								3		3													6	6	12
Total	4	1	6	..	2	..	..	..	1	..	1	1	4	..	12	8	20	..	9	..	1	..	1	2	..	..	11	2	13	..	1	..	..	1	..	..	..	..	..	..	..	69	55	124

CLASS IV.—DEVELOPMENTAL DISEASES.

Towns in Tolland Co.	Order 1.—Of Children. Stillborn.	Premature Birth.	Cyanosis.	Spina Bifida.	Malformations.	Teething.	Total. M.	Total. F.	Orders 2, 3, and 4. Childbirth.	Old Age. M.	Old Age. F.	Atrophy and Debility. M.	Atrophy and Debility. F.	Total for Class IV. Male.	Female.	Sex not stated.	Total.
Tolland,		1					1				1			1	1		2
Andover,		2						2			2				4		4
Bolton,										1	1			1	1		2
Columbia,												1		1			1
Coventry,											1	1	1	1	2		3
Ellington,										1				1			1
Hebron,		1	1				1	1						1	1		2
Mansfield,		1						1	1	2	1			2	3		5
Somers,											1				1		1
Stafford,		1					1				2			1	2		3
Union,										1	1		1	1	2		3
Vernon,	8	9				3	15	5		1	2			16	7		23
Willington,		2					1	1		1	3			2	4		6
Total,	8	17	1	..	..	3	19	10	1	7	15	2	2	28	28	....	56

CLASS V.—VIOLENT DEATHS.

Towns in Tolland Co.	Order 1.—Accident and Negligence. Railroad Accidents.	Fractures.	Wounds.	Burns and Scalds.	Poison.	Drowning.	Suffocation.	Otherwise.	Total. M.	Total. F.	Orders 3, 4, and 5. Homicide. M.	Suicide. M.	Suicide. F.	Violent not Classed Casualty. M.	Violent not Classed Casualty. F.	Cause not Reported. M.	Cause not Reported. F.	Total for Class V. Male.	Female.	Total.
Tolland,		1							1									1		1
Andover,																				
Bolton,																	1		1	1
Columbia,				1						1						1		1	1	2
Coventry,																	2		2	2
Ellington,		1								1									1	1
Hebron,																				
Mansfield,																1		1		1
Somers,																				
Stafford,				1					1			1	1			3	1	5	2	7
Union,																				
Vernon,			1		1	1		1	3	1						2		5	1	6
Willington,						1			1									1		1
Total,	..	2	1	2	1	2	..	1	6	3	..	1	1	...	...	7	4	14	8	22

GRAND TOTAL FOR ALL CLASSES.

Towns in Tolland Co.	Male.	Female.	Sex not stated.	Total.
Tolland,	8	4		12
Andover,	3	10		13
Bolton,	3	6		9
Columbia,	3	8		11
Coventry,	16	17		33
Ellington,	6	4		10
Hebron,	7	6		13
Mansfield,	15	13		28
Somers,	6	9		15
Stafford,	24	29	4	57
Union,	7	7		14
Vernon,	75	48		123
Willington,	15	14		29
Total,	188	175	4	367

Recapitulation of Table 4.

CAUSE OF DEATH	Hartford Co.	New Haven Co.	New London Co.	Fairfield Co.	Windham Co.	Litchfield Co.	Middlesex Co.	Tolland Co.	TOTAL.	PER CENT. TO TOTAL MORTALITY. 1880.*	1879.	1878.	1877.
ZYMOTIC DISEASES.													
Order 1, Miasmatic	542	549	331	329	200	95	124	101	2,271	22.56	18.59	22.51	25.49
" 2, Enthetic	10	7	4	3	1	2	1	...	28	.26	.11	.22	.19
" 3, Dietic	13	15	4	4	2	3	3	2	46	.45	.41	.37	.46
" 4, Parasitic	1	1	1	2	....	....	....	1	6	.06	......	......	......
Total, Class I	566	572	340	338	203	100	128	104	2,351	23.35	19.13	23.10	26.14
CONSTITUTIONAL DISEASES													
Order 1, Diathetic	80	82	55	76	25	36	21	26	401	3.98	4.11	4.49	4.34
" 2, Tubercular	324	412	224	241	109	110	69	35	1,524	15.14	15.16	15.90	17.03
Total, Class II	404	494	279	317	134	146	90	61	1,925	19.12	19.49	20.39	21.37
LOCAL DISEASES.													
Order 1, Nervous Sytem	274	373	186	220	96	100	97	32	1,378	13.69	13.29	13.09	12.75
" 2, Organs of Circulation.	108	121	87	97	44	42	25	21	545	5.41	5.16	4.87	4.92
" 3, Organs of Respiration.	213	275	127	192	67	100	47	37	1,058	10.51	10.31	7.34	8.78
" 4, Organs of Digestion	84	133	55	90	31	22	24	20	459	4.57	5.14	3.67	4.24
" 5, Urinary Organs	77	66	27	40	11	22	14	13	270	2.68	2.50	2.28	2.05
" 6, Generative Organs	10	17	2	8	3	6	3	1	50	.49	.41	.22	.39
" 7, Organs of Locomotion.	1	....	....	1	....	....	....	....	2	.02	.20	.12	.32
" 8, Integumentary System	14	10	8	6	6	2	2	....	48	.47	.26	.24	.54
Total, Class III	781	995	492	654	258	294	212	124	3,810	37.85	37.34	31.83	33.98
DEVELOPMENTAL DISEASES.													
Order 1, Of Children	135	227	67	98	46	42	28	29	672	*3.27	6.40	5.77	6.07
" 2, Of Women	10	7	8	4	3	3	1	1	37	.36	.68	.64	.81
" 3, Of Old People	111	120	60	95	35	59	29	22	531	5.27	5.56	5.78	3.23
" 4, Of Nutrition	9	35	29	49	10	5	5	5	147	1.46	1.54	1.36	2.41
Total, Class IV	265	389	164	246	94	109	63	57	1,387	10.40	14.15	13.55	14.52
VIOLENT DEATHS.													
Order 1, Accident	53	94	59	71	24	16	22	9	348	3.45	3.26	3.76	3.10
" 2, Homicide	1	....	....	....	....	1	....	....	2	.02	.07	.13	.11
" 3, Suicide	13	17	2	5	2	3	4	2	48	.47	.70	.61	.57
" 4, Execution.*	....	....	....	1	....	....	....	....	1	.01	.01	......	......
Sudden, Cause unascertained	18	11	13	19	5	2	5	....	73	.72	.35	.37	.21
Cause not stated	57	14	38	191	91	21	16	10	438	4.35	5.43	6.27	......
Total, Class V	142	136	112	287	122	43	47	21	910	9.04	9.83	11.13	3.99
Sex and Cause not stated	4	4	4	12	1	....	....	....	25	.24	.06	......	......
Grand Total	2162	2590	1391	1854	812	692	540	367	10,408	100.00	100.00	100.00	100.00

* Stillborn not included.

TABLE 5.

DEATHS IN TOWNS. ALPHABETICAL ARRANGEMENT, DISTINGUISHED BY NATIONALITY, AGE, AND SEASON.

NAME OF TOWN.	Under 1.	1 to 5.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	Over 100.	Unknown.	Birthplace, Conn.	All other States.	Birthplace, Ireland.	Birthplace, Germany.	Birthplace, England.	Birthplace, Sweden.	Birthplace, Canada.	All other Foreign Countries.	Unknown.	Deaths in Spring.	Deaths in Summer.	Deaths in Autumn.	Deaths in Winter.	Total.
Andover	4					1			2		5	1			11								2	2	3	5	3	13
Ashford	2		1	1				1	3	1	2				11									1	3	2	5	11
Avon	1		1	1		3		1	2	5	4	2			17	1	2							11	5	2	2	20
Barkhamstead	1					2	2			3	3				9	2								3		5	3	11
Beacon Falls	3			1	3		2		1		1												11	2	4	1	4	11
Berlin	5	4	1			2	1	1	10	3	6				24	3	5	1						11	12	7	3	33
Bethany	1	1			1	1			1	4				1	10									3	3	3	1	10
Bethel	10	5	1	2	6	4	3	7	5	7	9				48	5	5	1						17	10	15	17	59
Bethlehem		1		1		1		2	2	1	2				9	1								4	2	1	3	10
Bloomfield	1	1		2	1		3		3	4	1				13	1	1		1					4	4	5	3	16
Bolton	2				1				2	3	1				7	1			1					1	2	1	5	9
Bozrah	4	2		1		1	1		2	3	1	1			10	2	1				3			8	1		7	16
Branford	6	7	3	2	2	1	4	3	6	6	1				33	5	3							16	12	5	8	41
Bridgeport	130	97	26	36	42	44	45	49	34	46	18	1			366	60	74	18	22			7	21	128	169	127	144	568
Bridgewater	3	3		2	1	2		1			1				11	1	1							7		3	3	13
Bristol	12	13	4	3	10	3	6	3	7	19	5				64	8	8	2	1	2				14	30	25	16	85
Total	195	134	37	52	67	65	67	68	80	105	60	5		1	643	90	100	22	25	2	3	7	34	232	260	207	227	926

TABLE 5.—CONTINUED.

NAME OF TOWN	Under 1.	1 to 5.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	Over 100.	Unknown	Birthplace, Conn	All other States.	Birthplace, Ireland	Birthplace, Germany.	Birthplace, England.	Birthplace, Sweden.	Birthplace, Canada.	All Other Foreign Countries.	Unknown.	Deaths in Spring.	Deaths in Summer	Deaths in Autumn.	Deaths in Winter.	Total.
Brookfield	1	1		1		2		1	4	2	9				19		1		1					7	2	6	6	21
Brooklyn	10	4	3		5		2	1	3	4	3	3			22	9					7			6	16	9	7	38
Burlington	2	2			1	3			2	3		1			13			1						2	2	6	4	14
Canaan	1					1		2	3	2	2												11	2	4	2	3	11
Canterbury	2	2		1	2			1	4	4	5	1			21			1						5	4	5	8	22
Canton	16	11		1	4	9	3	1	5	7	5				46	2	6	3			5			11	15	16	20	62
Chaplin		1	1			1		1	1		3				7	1								4		3	1	8
Chatham	3	3		2	2		2	1	1	2	3				18								1	3	5	5	6	19
Cheshire	4	1			3	1	6	4	4	6	3	2			22	4	3	1	3		1			13	9	4	8	34
Chester	1			1			1	1		1	1	1			7									2	2	2	1	7
Clinton	4		1	1	4		2		1	7	2	2			18				1				5	8	6	4	6	24
Colchester	7	4	2	6	10	1	1	5	7	6	5	1			41	2	6	1	1				4	18	13	17	7	55
Colebrook	2									1	1				4									1	1	2		4
Columbia								1	2	2	4	2			5	5		1						4	3		4	11
Cornwall	3	2			1		1	1	3	3	3				15			1			1			2	8	3	4	17
Coventry	4	3		3		1	2	3	3	9	5				24	4	1		1				3	8	8	12	5	33
Cromwell	1			1	3	1	1	3	3	4	1				14	3			1					9	3	2	4	18
Danbury	45	12	5	8	16	12	14	15	18	25	9	2		9	102	47	27	4	8	1	1			40	66	40	44	190
Total	106	46	12	25	51	32	35	41	64	88	64	15	..	9	398	77	44	13	16	1	15	..	24	145	167	138	138	588

Darien	6	3	1	2	3	2		4	3	5	4	3			28	6	2							10	7	14	5	36
Derby	59	30	4	13	14	12	10	13	19	17	4				135	19	31		6		1	3		57	66	36	36	195
Durham	1	1	1	1	2			3	3		2				9	3	1				1			3	4	6	1	14
Eastford	1	2						1	2	2	1				9									4	4	1		9
Easton	2				1		1		3	2	3	1			12			1						2	1	6	4	13
East Granby									3	2	1				5	1								2	1	2	1	6
East Haddam	5			7	1	4	1	4	6	9	12				42	4	2					1		13	17	9	10	49
East Hartford	14	9	3	3	1	5	5	6	4	9		3			48	6	6	1			1			15	24	16	7	62
East Haven	4	4		2		1	1	2	3	3	1				19	1		1						7	6	2	6	21
East Lyme	4	5		2	4	2	1	2	2	3	3	1			24	2			2		1			12	5	8	4	29
East Windsor	8	9	3	4	2	3	4	1	2	6	3				40	2	3							10	16	9	10	45
Ellington	4	1				1	1		1	1		1			8	1	1							1	4	4	1	10
Enfield	24	20	9	15	9	9	9	12	8	10	7	2			25	15	25	20	21		25	1	2	35	39	34	26	134
Essex	3	1		1	3			1	3	5	7				21	3								5	2	6	11	24
Fairfield	15	3		2	5	4	4	1	8	12	4	2			53	1	5		1					23	12	13	12	60
Farmington	7	4	1		3	3	2	1	1	8	6	2			31	1	5		1					13	13	7	5	38
Franklin				1			1		2	4	2	2			10	2	2							3	4	4	3	14
Glastonbury	5	1	1	3	5	3	4	4	3	5	3	1			28	3	2	4			1			11	9	6	12	38
Goshen	2							2	2	2	2				9	1								3	1	1	5	10
Granby	1	2	1			2	2	1	3	3	1				16									4	4	6	2	16
Greenwich	11	9	6		5	4	2	9	6	12	16	1		3	48	20	7	2	2	1			1	21	29	13	18	81
Griswold	18	4		3	5	3	2	3	1	8	1				34	5	6		1		2			9	16	12	11	48
Groton	6	7	6	11	10	6	11	8	16	13	6	1		1	83	13	3		1				3	28	19	30	26	103
Guilford	5			1	3	1	4	5	3	4	7	2			31	2	1						1	14	9	7	5	35
Haddam	2	2	2	1	3	2	2	2	3	3	3	1			24	1	1							9	5	5	7	26
Hamden	2	2	1			2	4	5	8	3		1			18	2	5		3					6	7	8	7	28
Hampton	4			1	2				2	3		1			13									4	4	1	4	13
Hartford	182	87	19	31	72	84	62	69	83	64	38	4	1	45	497	102	165	17	20	6	3	31		210	263	189	179	841
Hartland		1						1	1	2	1				4	2								5			1	6
Harwinton	4	1	1	1	1	1			1		2	1			13									4	3	6		13
Hebron	2			1		1	2	1	1	3	2				10	1	2							1	4	5	3	13
Huntington	13	6	3	1	2	5	1	1	3	6	3				42	1	3		1					8	12	8	19	47
Kent	3	1		2	1	1	2	2	1	3	5	1			19	1	1		1					6	5	6	5	22
Total	417	215	62	109	147	171	138	164	210	232	150	31	1	49	1408	221	279	46	60	7	35	36	7	558	615	480	446	2099

TABLE 5.—CONTINUED.

NAME OF TOWN.	Under 1.	1 to 5.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70	70 to 80.	80 to 90.	90 to 100.	Over 100.	Unknown.	Birthplace, Conn.	All other States.	Birthplace, Ireland.	Birthplace, Germany.	Birthplace, England.	Birthplace, Sweden.	Birthplace, Canada.	All other Foreign Countries	Unknown.	Deaths in Spring.	Deaths in Summer.	Deaths in Autumn.	Deaths in Winter.	Total.
Killingly	41	11	2	4	8	13	6	3	20	10	12	1	..	2	81	25	5	..	3	..	9	..	10	28	37	27	41	133
Killingworth	....	....	....	....	1	1	....	1	5	4	2	....	..	....	14	....	....	..	..	..	..	..	..	4	4	3	3	14
Lebanon	2	....	2	....	2	1	....	....	1	3	3	....	..	2	11	3	....	..	..	..	..	2	..	3	4	3	6	16
Ledyard	5	1	....	....	3	1	6	2	2	....	....	....	..	....	18	1	....	..	..	1	..	..	..	5	2	8	5	20
Lisbon	1	....	....	....	....	1	1	....	....	....	....	2	..	....	5	....	....	..	..	..	..	..	..	3	....	....	2	5
Litchfield	3	4	1	2	5	3	6	3	3	8	3	1	..	....	30	2	5	..	1	..	..	..	4	5	14	11	12	42
Lyme	6	....	....	....	....	1	1	1	3	....	1	1	..	....	14	....	....	..	..	..	..	..	..	....	5	4	5	14
Madison	4	2	....	1	....	2	2	2	3	6	4	1	..	....	24	2	1	..	..	..	..	..	..	5	8	8	6	27
Manchester	18	10	7	10	21	5	8	7	15	7	2	1	..	....	69	13	17	2	5	5	..	..	..	30	29	33	19	111
Mansfield	5	1	2	1	1	2	1	....	1	5	6	3	..	....	24	2	1	..	..	..	1	..	..	11	8	3	6	28
Marlborough	1	....	....	....	1	....	1	1	1	1	1	....	..	....	6	1	....	..	..	..	..	..	..	2	1	2	2	7
Meriden	58	28	5	9	25	18	19	27	15	19	11	2	..	16	154	23	35	11	9	..	6	..	14	67	78	53	54	252
Middlebury	1	....	....	....	....	....	2	1	3	4	4	1	..	....	12	1	1	..	1	..	..	1	..	6	5	3	2	16
Middlefield	....	1	....	2	....	1	1	....	2	2	....	....	..	....	6	2	....	..	1	..	..	..	..	1	4	3	1	9
Middletown	39	27	4	9	21	11	15	25	19	17	15	1	..	....	139	14	29	2	8	..	..	6	5	32	59	50	62	203
Milford	1	3	....	....	2	2	2	4	8	9	5	1	..	....	32	3	1	1	..	..	..	..	..	7	9	11	10	37
Monroe	1	1	....	....	1	3	1	....	1	1	4	....	..	....	12	....	....	1	..	..	..	..	..	6	3	2	2	13
Montville	7	9	2	4	4	2	2	4	8	10	4	2	..	....	48	2	....	1	1	..	..	6	..	14	19	11	14	58
Total	193	98	25	42	95	67	74	81	110	106	77	17	..	20	669	94	95	18	29	6	16	15	33	229	289	235	252	1005

Morris	1			2				1		2		1			6				1					2	2		3	7
Naugatuck	25	10	3	3	6	5	4	3	7	7	1	4			56	3	10	2	5		1	1		21	22	20	15	78
New Britain	75	29	5	6	26	19	20	19	19	10	7				147	16	50	8	6	2	1		4	55	80	47	52	234
New Canaan	4	2	2	5	5	4	1	2	12	10	7	1			31	12	1		1					16	9	8	12	45
New Fairfield	3	1	1		1	1	1	1	2	3	5	1			20									6	2	9	3	20
New Hartford	10	2	1	4	2	3	2	2	2	1	1	2			21	1	6		1		2	1		7	7	10	8	32
New Haven	303	160	38	46	97	100	112	110	102	61	44	6	2		741	114	216	26	22		5	39	18	309	336	239	297	1181
Newington	4	6			2			2	1	3	6				21	3								5	6	8	5	24
New London	25	74	51	17	24	17	13	16	18	12	7	7	1		232	22	19	1	1			7		65	62	89	66	282
New Milford	13	4	2	4	8	4	5	4	14	14	5	1			56	5	3	1					14	25	17	14	22	78
Newtown	15	3	1	2	3	3	3	8	9	12	9	2			57	1	12							20	17	13	20	70
Norfolk	1				4	1	3	1	2	12	6				23	2	5							8	7	10	5	30
North Branford		1					1	1	1	3	4				10		1							3	2	2	4	11
North Canaan	4							3	1		1				5	3	1							4	2	1	2	9
North Haven	4				3	1		1		1		1			10			1							3	5	3	11
North Stonington	4	3	1	4	3	1	1	2	5	5	1	1			19	12								10	2	10	9	31
Norwalk	58	27	4	10	8	17	13	16	21	27	10			15	153	4	15	3	4			1	46	55	64	55	52	226
Norwich	82	41	21	25	49	29	33	36	33	49	16	6	2		268	46	66	6	17		16	3		104	116	114	88	422
Old Lyme	1				1	2	2	3	5	2	5	3			21	1	2							7	6	7	4	24
Old Saybrook	4	5	1	2	3	2	1	1	1	2	3				20	2	3							4	11	5	5	25
Orange	14	3		2	3	2	3	4	9	3	1	1			34	5	1	1	3			1		12	13	13	7	45
Oxford	2						3	1	2	3	2	1			14									6	4		4	14
Plainfield	12	10	5	8	8	4	4	3	9	6	2	1		1	44	10	2		3		12		2	20	15	17	21	73
Plainville	5	8	7	3	3	1			4	4	4				35	3	1							5	12	13	9	39
Plymouth	6	1		2	6	3	2	1	4	3	1				22	1	1	2	2			1		8	8	7	6	29
Pomfret	3		1		4	2	1	2	7	4	4				22	6								11	9	4	4	28
Portland	17	10	1	3	5	7	11	4	9	7	4	2			58	16	5			1				18	22	14	26	80
Preston	5	1	1	3	4	3	5	2	3	6	4	1		2	35	1	3	1						7	8	12	13	40
Prospect				1					2	1	2	1			7									3	1	2	1	7
Putnam	37	23	3	12	8	3	9	5	7	5	8			3	81	6	6		1		25		4	24	48	32	19	123
Redding	6			1			2	2	3	5	4				18	4	1							11	3	3	6	23
Ridgefield	3		1	1			4	2	3	8	10	2			20	13	1							10	9	7	8	34
Rocky Hill	2				1			4			2				7		2							3	4	1	1	9
Total	748	424	150	166	287	234	259	262	318	291	186	45	5	21	2314	312	433	52	67	3	62	54	88	864	929	791	800	3384

TABLE 5.—CONTINUED.

NAME OF TOWN.	Under 1.	1 to 5.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	Over 100.	Unknown.	Birthplace, Conn.	All Other States.	Birthplace, Ireland.	Birthplace, Germany.	Birthplace, England.	Birthplace, Sweden.	Birthplace, Canada.	All Other Foreign Countries.	Unknown.	Deaths in Spring.	Deaths in Summer.	Deaths in Autumn.	Deaths in Winter.	Total.
Roxbury	1	1			1				3	5	3				13		1							3	4	3	4	14
Salem							1		1	1	3				6									2		2	2	6
Salisbury	17	2		4	5	7	3	3	6	10	3				47	10	2						1	20	14	11	15	60
Saybrook	3	1				1		2	2	4	1	2			14	1					1			2	9	4	1	16
Scotland							1	1	4	4	2				10	2								5	3	1	3	12
Seymour	6	1	3		5	1	7	3	8	2			1		29	1	6					1		9	11	7	10	37
Sharon	8	3	1	1		4	1	2	4	8	4	1											37	7	11	4	15	37
Sherman	2			2	3		4	2	2	3	1				16	3								9	4	3	3	19
Simsbury	9	1			1		3	1	4	9	7				25	5	3		2					15	3	6	11	35
Somers	2				2	2	1	3	1	2	2				10	3	2							2	4	4	5	15
Southbury	1	2		1	3			2	2	3	5	5			20		3	1						6	4	5	9	24
Southington	23	7	1	6	9	3	10	9	8	9	3	4			59	11	12	2	4				4	30	24	15	23	92
South Windsor	6	1	1	1	4	2	1	1	1	4	3				25									7	5	7	6	25
Sprague	14	4		5	5	2	3	6	2	3					27	5	3				9			11	12	11	10	44
Stafford	10	7	4	5	5	5	4	4	6	2	4			1	27	17	4	1	1		3		4	15	12	19	11	57
Stamford	30	10	5	7	13	15	16	20	16	26	10	2			103	35	22	4	5		1			48	41	41	40	170
Sterling	1			1	1			1		2	2				8										4	1	3	8
Stonington	22	13	8	2	13	13	9	7	12	12	7	1			71	31	12		4			1		29	29	40	31	129
Total	155	53	23	35	70	55	64	67	82	109	60	15	1	1	510	124	70	8	16	..	14	2	46	220	194	184	202	800

Stratford	3	1	1			2	2		4	6	4	2											25	10	2	8	5	25
Suffield	4	3	3		1	2	2	2	7	6	10	1			26	9	3	1	2					12	5	17	7	41
Thompson	34	29	5	9	10	1	1	7	9	7	6				79	16	2		1		20			31	31	30	26	118
Thomaston	8	6	4		1	2	3	1	2	4	2				20	3	7		2				1	7	13	7	6	33
Tolland	2				1	2		4	1	1	1				9	1		1					1	5	1	2	4	12
Torrington	8	2	1	1	1	2	4	4	6	8	5	4			31	6	7		1			1		12	10	15	9	46
Trumbull	3			2		3		1	3	3	6				19	2								6	10	4	1	21
Union	1	1	2				2	1	1	4	2												14	5	2	4	3	14
Vernon	50	15	2	6	9	3	8	10	14	3	3				82	15	8	7	6	1	1		3	14	45	41	23	123
Voluntown	4	2		2	2			2	3		5	1			13	6	1				1			4	9	4	4	21
Wallingford	10	5	2	4	3	1	8	4	4	8	3			3	37	4	8		1				5	19	13	12	11	55
Warren	1					2		1		1	1				5			1						3	2	1		6
Washington	3			1			2	2	2	3					11	2								4	1	1	7	13
Waterbury	113	66	10	18	37	43	26	14	27	27	19	2		1	249	40	89	6	13		1	5		92	106	92	113	403
Waterford	3	4	3	2	8	3	1	2	6	7	5	1			40		2	1	2					8	15	8	14	45
Watertown	3	4	1		5	2	2	4	2	5	6	1		1	29	1	3						3	12	12	3	9	36
Westbrook	3		1		1	1			1	5					12									4	4	2	2	12
West Hartford		2	1			2		3	3	2	6			3	11	2			1				8	5	3	7	7	22
Weston	2		1					3	2	2	1				9	2								1	5	2	3	11
Westport	12	6	1	4	5	2	5	5	7	11	4	2			446	11	7							19	16	13	16	64
Wethersfield	5	2			1	2	1	4	8	9	3	2	1		27	4	5					2		11	9	11	7	38
Willington	8	1			2	1	3	2	1	4	7				24	3					2			10	9	6	4	29
Wilton	7	3			2	4	1	3	7	5	5	1			35	3								13	8	4	13	38
Winchester	11	8		5	8	9	5	4	8	7	3	1			37	19	11	1	1					18	20	13	18	69
Windham	44	11	4	14	14	16	20	14	13	10	4	4		2	101	22	28	1	3		7		8	42	52	40	36	170
Windsor	7	5			2	1	1	7	5	8	4		1		30	6	4		1					12	9	3	17	41
Windsor Locks	3	4	1	2	1	1	4	4	3	3	2				14	4	7		1			2		8	6	8	6	28
Wolcott	2									2	1				4		1							2		2	1	5
Woodbridge	2		1			1	2		2	2	2				11				1					6	2	4		12
Woodbury	5		1		4	1	2	4	8	10	4	1			38		2							8	9	11	12	40
Woodstock	2	1	3		3	1		1	1	9	4				16	6					1		2	8	6	7	4	25
Total	363	181	48	70	123	110	105	113	60	182	127	23	2	10	1059	187	195	..	36	1	33	10	70	411	435	382	388	1616

RECAPITULATION OF TABLE 5.

	Total. 1880.	Total. 1879.	Per cent. to Total Mortality. 1879.	1880.
AGES.				
Deaths under 1 year	2,159	1,761	18.7	20.5
" from 1 to 5	1,150	919	9.6	11.0
Total, First Period, Infantile	3,309	2,680	28.3	31.5
Deaths from 5 to 10	357	401	4.2	3.4
" " 10 to 20	582	482	5.2	5.4
Total, Second Period, Youth	939	883	9.4	8.8
Deaths from 20 to 30	857	782	8.5	8.2
" " 30 to 40	724	667	7.5	6.9
" " 40 to 50	742	612	7.2	7.1
" " 50 to 60	796	731	8.0	7.4
Total, Third Period, the Productive Age	3,119	2,792	31.2	29.6
Deaths from 60 to 70	923	904	9.0	8.8
" " 70 to 80	1,122	1,048	9.7	10.7
" " 80 to 90	725	661	8.3	6.9
" " 90 to 100	151	145	1.6	1.4
" over 100	9	13	.1	.8
Total, Fourth Period, Old Age	2,930	2,771	28.7	28.6
Age not stated	111	268	2.0	1.5
Total	10,408	9,394	100.00	100.00
NATIONALITIES.				
Deaths of those born in Connecticut	7,036	6,524	69.8	67.6
" " " all other States	1,105	958	9.9	10.5
Total for United States	8,141	7,482	79.7	78.1
Deaths of those born in Ireland	1,216	1,006	9.9	11.3
" " " Germany	178	175	3.2	1.5
" " " England	249	171	3.1	2.0
" " " Sweden	20	7	.1	1.6
" " " all other Foreign Countries	604	553	4.0	5.5
Total Foreign Births	2,267	1,912	20.3	21.9
Total	10,408	9,394	100.00	100.00
SEASON.				
Deaths in Spring	2,659	2,208	23.5	25.54
" Summer	2,879	2,301	24.0	27.66
" Autumn	2,417	2,095	20.0	23.22
" Winter	2,453	2,790	32.5	23.56
Total	10,408	9,394	100.00	100.00
BIRTHS.				
Births in Spring	3,391	3,396	24.3	24.52
" Summer	3,422	3,500	25.6	24.64
" Autumn	3,540	3,458	24.3	25.57
" Winter	3,476	3,597	25.8	25.27
Total	13,829	14,051	100.00	100.00

TABLE 6.

NOSOLOGICAL ARRANGEMENT BY COUNTIES WITH COMPARATIVE MORTALITY FOR FIVE YEARS.

DISEASE.	Hartford Co.	New Haven Co.	New London Co.	Fairfield Co.	Windham Co.	Litchfield Co.	Middlesex Co.	Tolland.	Total 1880.	Per cent. to Total Mortality.	1879.	1878.	1877.	1876.	Aggregate for 5 years.	Average for 5 years.
I. 1. MIASMATIC										23.38						
Small Pox	1	....	6	2	....	....	....	....	9	.09	4	....	...	23	36	7.2
Varicella	....	....	....	....	....	....	....	....	....	....	1	....	4	....	5	1
Measles	8	27	....	6	3	2	5	8	59	.60	14	20	25	56	174	34.8
Scarlet Fever	14	22	39	8	5	....	....	4	92	.93	164	215	216	171	858	171.6
Diphtheria	63	60	113	42	30	5	6	13	332	3.43	256	464	589	564	2205	441
Quinsy	....	1	....	1	....	....	1	....	3	.03	....	....	2	1	6	1.2
Croup	45	49	14	38	17	4	.8	6	181	1.87	149	178	178	221	907	181.4
Whooping Cough	17	45	12	16	7	1	3	3	104	1.08	....	68	76	39	287	57.4
Typhoid Fever	40	47	32	31	34	21	19	18	242	2.51	159	260	321	361	1343	268.6
Erysipelas	8	17	9	5	1	4	6	5	55	.56	49	56	49	61	270	54
Puerperal Fever	10	14	8	6	6	6	3	....	53	.54	40	42	47	43	225	45
Carbuncle	....	1	....	....	....	....	....	....	1	.01	5	6	3	....	15	3
Influenza	....	....	....	....	....	....	....	....	....	....	....	....	8	25	33	6 6
Dysentery	11	18	8	11	10	4	6	1	69	.70	75	86	83	106	419	83.8
Diarrhea	29	31	14	5	9	4	10	6	108	.11	86	60	94	98	446	89.2

TABLE 6.—Continued.

DISEASE.	Hartford Co.	New Haven Co.	New London Co.	Fairfield Co.	Windham Co.	Litchfield Co.	Middlesex Co.	Tolland Co.	Total 1880.	Per cent. to Total Mortality.*	1879.	1878.	1877.	1876.	Aggregate for 5 years.	Average for 5 years.
Cholera Infantum	177	114	56	93	51	27	25	27	570	5.93	351	422	447	605	2395	479
Intermittent Fever	8	6	2	4	1	3	6	2	32	3.3	35	54	37	11	169	33.8
Remittent Fever	4	2	....	1	....	....	....	....	7	.07	25	13	5	11	61	12.2
Typho-Malarial Fever	41	49	2	30	12	5	12	2	153	1.58	117	78	28	....	376	75.2
Congestive Fever	9	8	2	9	3	2	....	....	33	.34	21	....	....	....	54	10.8
Malarial Fever	29	5	....	2	....	1	3	....	40	.41	....	....	....	....	40	8
Rheumatism	14	15	7	11	3	1	6	3	60	.61	....	43	51	47	501	100.2
Cerebro Spinal Meningitis	14	16	7	8	8	5	5	2	65	.66	59	47	39	....	210	42
I. 2. Enthetic	....	....	....	....	....	....	....	....	....	.31	....	....	....	....	....	....
Syphilis	8	....	....	....	2	....	....	....	10	.10	....	8	8	8	34	6.8
Stricture of Urethra	....	....	....	....	....	....	....	....	....	....	....	....	2	....	2	.4
Hydrophobia	....	....	....	1	....	....	....	....	1	.01	2	7	8	4	22	4.4
Glanders	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1	.2
Malignant Pustule	....	1	....	....	....	....	....	....	1	.01	.	....	....	7	8	1.6
Pyaemia and Septicaemia	1	6	4	1	1	2	2	1	18	.19	11	3	....	....	32	6.4
I. 3. Dietic	....	....	....	....	....	....	....	....	....	.53	....	....	....	....	....	....
Privation	1	3	....	1	....	....	....	1	6	.06	....	5	3	1	15	3
Purpura	....	....	1	1	....	....	....	1	3	.03	....	6	3	4	16	32
Alcoholism	12	12	3	2	2	3	1	2	37	.38	29	20	35	31	152	30.4

* Stillbirths not included, nor cause not stated

I. 4. PARASITIC	....	....	....	....	....	....	....	....	....	·06	....	....	....	....	.....	.....
Thrush	....	1	1	2	....	....	....	1	5	.05	4	....	3	3	14	2.8
Worms	1	....	....	....	....	....	....	....	1	.01	....	2	....	....	3	.6
II. 1. DIATHETIC	....	....	....	....	....	....	....	....	....	4.10	....	....	....	....	.....	.....
Lupus	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1	.2
Gout	....	1	....	....	....	1	....	....	2	.02	....	....	....	4	6	1.2
Dropsy and Anaemia	21	32	16	38	9	14	9	3	142	1.43	154	159	155	158	768	133.6
Cancer	52	46	35	36	14	14	9	20	226	2.28	209	245	219	175	1074	214.8
Mortification	....	....	1	1	....	....	....	....	2	. 2	7	16	20	14	59	11.8
Senile Gangrene	7	3	3	1	2	8	3	2	29	.30	14	4	....	....	47	9.4
Leueocythaemia	1	....	....	....	....	1	....	....	2	.02	....	....	....	....	2	.4
Exophthalmic Goitre	1	....	....	....	....	....	....	....	1	.01	....	....	....	....	1	.2
Addison's Discase	1	....	....	....	1	....	....	....	2	.02	1	....	....	....	3	.6
II. 2. TUBERCULAR	....	....	....	....	....	....	....	....	....	15.90	....	....	....	....	.....	.....
Scrofula	9	6	6	7	9	4	4	2	27	.48	25	31	49	44	196	39.2
Tabes Mesenterica	20	54	4	13	2	2	7	5	107	1.09	61	62	97	75	402	80.4
Tubercular Consumption	285	335	208	221	94	100	56	28	1327	13.78	1307	1316	1301	1306	6557	1311.4
Hydrocephalus	10	17	6	10	4	4	2	1	54	.55	65	54	83	69	325	65
III. 1. NERVOUS SYSTEM	....	....	....	....	....	....	....	....	....	14.24	....	....	....	....	.....	.....
Cephalitis	....	....	....	..	....	....	....	....	....	....	....	....	52	53	105	21
Apoplexy	65	57	34	51	16	25	21	14	283	2.97	270	267	224	262	1306	261.2
Paralysis	58	85	51	49	33	19	23	6	324	3.34	264	252	222	237	1299	239.8
Insanity	16	3	7	4	3	3	16	1	53	5.4	50	40	25	15	183	36.6
Chorea	....	....	....	....	1	....	....	....	1	.01	1	2	1	6	11	2.2
Epilepsy	3	8	4	6	1	3	1	1	27	.28	20	20	40	14	130	2.6
Tetanus	2	12	....	2	....	1	5	1	23	.24	26	12	16	15	92	18.4
Couvulsions	46	111	22	44	10	16	7	3	259	2.63	256	253	228	244	1240	24.8
Brain Disease	42	39	31	37	21	18	18	5	211	2.17	211	231	240	175	1068	213.6
Meningitis	35	55	28	18	9	14	4	1	164	1.70	134	143	140	159	740	108
Neuralgia	4	1	1	1	....	1	1	...	9	09	3	....	....	....	12	2.4
Spinal Disease	6	3	6	9	1	....	1	...	26	.27	8	2	5	....	41	8.

TABLE 5.—CONTINUED.

DISEASE.	Hartford Co.	New Haven Co.	New London Co.	Fairfield Co.	Windham Co.	Litchfield Co.	Middlesex Co.	Tolland Co.	Total 1880.	Per cent. to Total Mortality.	1879.	1878.	1877.	1876.	Aggregate for 5 years.	Average for 5 years.
III. 2. ORGANS AND CIRCULATION	....	....	....	....	....	....	....	....	....	5.98	....	....	....	....	......	......
Pericarditis	2	3	11	4	4	2	....	1	27	.28	28	18	32	52	157	31.4
Aneurism	1	4	2	1	....	2	1	...	11	.12	13	12	3	18	57	11.4
Heart Disease	105	111	73	90	39	37	24	20	499	5.17	440	424	399	285	2067	413.4
Embolism	...	3	....	2	....	....	....	....	5	.05	5	5	....	....	15	.3
Phlebitis	....	...	....	....	....	1	1	...	2	.02	2	....	....	....	4	.8
Angina Pectoris	1	1	1	1	...	1	....	....	5	.05	5	3	5	....	18	3.6
Hemorrhage	3	4	10	9	....	....	1	1	28	.29	22	30	....	39	119	23.8
III. 3. RESPIRATORY ORGANS										11.10						
Epistaxis	....	....	....	....	....	....	....	....	....	....	....	1	....	....	......	......
Laryngitis	1	5	1	2	1	2	1	1	14	.15	16	15	26	18	89	17.5
Bronchitis	50	56	10	29	8	8	8	4	173	1.78	136	83	86	80	558	111.6
Pleurisy	6	4	3	3	2	....	2	2	22	.23	17	11	9	17	76	15.2
Pneumonia	137	165	90	140	47	81	28	26	712	7.42	626	458	478	776	3050	610.
Asthma	4	10	10	6	4	...	2	2	38	3.9	21	10	28	12	109	21.8
Lung Disease	15	37	14	12	5	9	6	2	100	1.03	155	111	155	110	631	105.2
III. 4. DIGESTIVE ORGANS										4.76						
Gastritis	10	27	8	14	2	2	7	4	74	.75	73	46	49	71	313	62.6

Enteritis	12	26	3	12	3	1	5	1	63	.64	60	45	56	50	274	56.8
Peritonitis	17	36	9	23	10	7	5	6	113	1.15	106	58	78	56	411	83.2
Ascites	2	2	1	2	....	1	....	....	8	.08	6	10	...	12	36	7.2
Ulceration of Intestines	2	3	2	1	2	....	....	2	12	.13	25	11	11	10	69	13.8
Hernia	2	1	2	3	....	2	1	...	11	.12	22	30	10	21	94	18.8
Intussusception	2	....	....	2	....	....	....	...	4	.04	2	5	8	6	25	5
Stricture of Intestines	....	4	2	2	2	....	1	....	11	.12	9	11	1	....	32	6.4
Fistula	1	....	....	....	1	....	....	....	2	.02	2	....	3	3	10	2
Stomach Diseases	8	7	4	11	3	2	....	1	36	.37	40	48	58	32	214	42.8
Stricture Oesophagus	....	....	....	....	....	....	....	....	....	....	1	1	1	....	3	.6
Colic	2	....	5	2	....	1	1	....	11	.12	8	16	....	14	49	9.8
Hepatitis	3	8	4	6	....	1	2	1	25	.26	21	15	17	28	106	21.2
Jaundice	2	1	2	5	2	1	....	1	14	.15	18	11	16	11	70	14
Liver Disease	21	18	13	9	7	4	2	4	78	.79	82	66	80	50	359	71.8
Spleen Disease	1	....	1	....	....	....	....	....	2	.02	4	2	....	1	9	1.8
III. 5. URINARY ORGANS										2.83						
Nephritis	2	11	2	....	....	6	....	....	21	.22	12	6	13	6	58	11.6
Bright's Disease	35	37	17	22	2	7	9	9	138	1.46	103	110	80	88	519	103.8
Diabetes	10	4	4	2	2	1	3	1	27	.28	29	24	27	32	139	27.8
Calculus	4	....	....	1	....	1	....	....	6	.06	8	3	6	4	27	5.4
Cystitis	8	4	1	3	....	3	2	1	22	.28	23	18	11	33	107	21.4
Kidney Disease	14	6	3	7	6	1	....	2	39	.40	44	35	40	40	198	39.6
Uraemia	3	3	....	4	1	3	....	....	14	.15	18	12	2	4	50	1.0
Prostatitis	1	1	....	1	....	....	....	....	3	.03	3	5	10	....	21	4.2
III. 6. GENERATIVE ORGANS										.52						
Ovarian Dropsy	...	1	....	1	1	1	....	1	5	.05	6	6	6	....	23	4.6
Ovarian Tumor	4	4	1	5	1	3	....	....	18	.19	10	7	6	....	41	8.2
Disease of Uterus	6	12	1	2	1	1	....	....	23	.24	14	8	17	11	73	14.6
Uterine Tumor	....	....	....	....	....	1	3	....	4	.04	9	....	10	8	31	6.2
III. 7. ORGANS OF LOCOMOTION										.03						
Arthritis	....	..	1	....	....	....	....	....	1	.01	1	3	1	2	8	1.6
Joint Disease	1	....	....	....	1	....	....	....	2	.02	13	5	22	14	56	11.2
Caries and Necrosis	....	....	....	....	....	....	....	....	....	....	4	3	8	1	16	3.2

TABLE 5.—CONTINUED.

DISEASE.	Hartford Co.	New Haven Co.	New London Co.	Fairfield Co.	Windham Co.	Litchfield Co.	Middlesex Co.	Tolland Co.	Total 1880.	Per cent. to Total Mortality	1879.	1878.	1877.	1876.	Aggregate for 5 years.	Average for 5 years.
III. 8. INTEGUMENTARY										.52						
Phlegmon	2	4	1	5	3	2	2	....	19	.20	10	5	15	32	81	16.2
Ulcer	3	3	4	...	....	....	....	....	10	.11	9	6	6	3	84	6.8
Skin Disease	2	2	....	....	....	....	...	...	4	.04	4	2	3	5	15	3
Tumor	7	1	3	2	3	....	....	....	16	.17	....	14	28	19	77	15.4
IV. 1. DEVELOPMENTAL OF CHILDREN										3.46						
Stillborn	61	113	46	66	16	27	6	8	343	......	286	300	337	413	1679	335.8
Premature Birth and Infantile Debility	57	88	15	27	23	8	10	17	245	2.51	242	290	141	139	1057	211.2
Ataleetasis and Cyanosis	8	7	2	6	1	3	2	1	30	.31	16	9	6	....	61	12.2
Spina Bifida	....	3	....	1	....	1	1	....	6	.06	11	4	4	....	25	5
Other Malformations	4	6	1	4	1	....	2	....	18	.19	24	19	21	23	105	2.1
Teething	5	10	3	2	6	2	7	3	38	.39	37	15	43	26	159	31.8
IV. 2. OF WOMEN										.38						
Childbirth	10	7	8	4	3	3	1	1	37	.38	64	24	71	53	249	49.8
IV. 3. OF OLD PEOPLE										5.48						
Old Age	111	120	60	95	35	59	29	22	531	5.48	522	606	476	574	2709	541.8
IV. 4. OF NUTRITION										1.54						
Atrophy and Debility	9	35	29	49	10	5	5	5	147	1.54	111	127	220	207	812	162.4
V. 1. ACCIDENT OR NEGLIGENCE										3.66						
Railroad Accident	....	7	5	4	....	....	....	....	16	.17	15	37	23	....	91	18.2

Fractures and Contusions	10	24	11	29	13	6	7	2	102	1.04	83	60	89	96	430	86
Wounds	4	13	5	6	2	2	2	1	35	.36	22	26	16	17	116	23.2
Sunstroke, Heat	....	....	....	....	....	....	....	....	2	.02	2	5	....	9	14	2.8
Burns and Scalds	9	15	5	4	3	2	2	2	42	.43	28	43	25	58	196	39.2
Freezing	....	....	....	....	....	....	....	....	2	.02	2	3	....	2	9	1.8
Poison	1	1	2	3	1	2	....	1	11	.12	15	18	26	22	282	16.4
Lightning	....	....	....	....	....	....	....	....	....	....	3	3	....	1	7	1.6
Drowning	8	10	25	16	3	3	7	2	74	.75	55	50	51	71	301	50.2
Tornado	....	....	....	....	....	....	....	....	....	....	....	30	....	....	30	.6
Suffocation	..	5	2	1	...	1	2	....	11	.12	11	13	...	20	55	11
Otherwise	21	19	6	11	2	....	2	1	62	.63	68	65	24	28	247	48.4
V. 3. Homicide										.02						
Homicide	1	....	....	....	....	1	....	....	2	.02	7	12	10	3	34	6.8
V. 4. Suicide										49						
Suicide	13	17	2	5	2	3	4	2	48	.49	58	55	52	39	262	50.4
V. 5. Execution										1.02						
Execution	1	....	....	1	....	....	....	....	2	.02	1	....	....	....	3	.6
V. 6. Not Classed										.85						
Violent Deaths	2	3	1	2	1	...	1	....	10	.11	6	....	....	....	16	3.2
Sudden	18	11	13	19	5	2	5	....	73	.74	21	36	19	33	2	30.4
Cause not stated	57	17	42	191	91	26	16	11	442	.29	449	282	592	635	2400	480

TABLE 7.

CAUSES OF DEATHS BY MONTHS, AGE, AND SEX.

January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Month not stated.	DISEASE.	Under 1.	1 to 5.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	Over 100.	Age not stated.	Male.	Female.	Sex not stated.	Total.
1	1		2	1	3	1	3	1	1	2	3		Abscess	1			1	4	2	4	1	4	1	1				11	8		19
34	20	12	24	25	39	42	39	23	28	24	43		Accident	13	37	45	51	59	33	29	30	28	20	5	3			267	85	1	353
					1				1				Addison's Disease					1				1						2			2
1	3	1	1			1	2	1	1				Aneurism						2	3	2	1	2	1				5	6		11
			1	2						1	1		Angina Pectoris					1	1	1	1	1						2	3		5
21	33	24	36	16	28	23	20	15	18	26	23		Apoplexy	1				7	9	20	50	66	73	52	4	1		158	125		283
		1	2	1	1			1		2			Ascites				1	1	1	2	2	1						3	5		8
5	4	4	8	1	2	2	2	2	1	3	4		Asthma	2			2	1	2	2	5	7	12	5				20	18		38
			1										Arthritis						1										1		1
						1							Atheroma											1					1		1
8		4	5	4	4	5	1	3	2	3	3		Burns and Scalds	1	17	4	3	5	3	2	1	2	3		1			24	17	1	42
12	3	1		5	17	10	9	3	3	2	9		Drowning	2	5	17	20	15	7	6		2						62	12		74
											2		Freezing					1		1								1	1		2
3	6	2	10	9	6	10	13	10	11	12	10		Fractures and Contusions	1	6	12	16	13	8	12	14	11	6	3				82	20		102
1	2	1	1		1	1	1	1	2				Poison			1	1	2	3	1		2	1					7	4		11
2	1		1				2	2	3	4	1		Railroad Accidents			1	1	4	1	1	4	2	2					12	4		16
2	2			1	2						4		Suffocation	5		1		1		1			2	1				4	7		11
					3	2							Sunstroke					1	1	2		1						4	1		5
2	4	2	1	2	1	6	4	3	4	2	4		Wounds		5	3	5	9	4	2	1	4	2					31	4		35
4	2	2	5	4	5	8	9	1	3	2	10		Otherwise	4	4	6	5	8	6	1	10	4	4	1	2			40	15		55
14	13	13	15	19	4	9	5	8	12	9	4		Bronchitis	25	29	6	2	6	7	3	12	11	15	8	1			51	73	1	125
7	9	8	4	2		1		1	6	6	4		Bronchitis, Capillary	30	13					3	1		1					30	18		48
19	14	11	16	14	16	16	22	24	20	18	21		Brain Disease	31	34	17	16	12	8	19	21	24	22	5	2			112	99		211

15	13	17	13	16	7	1	11	12	10	13	10	Bright's Disease				2	12	20	22	27	28	21	6			85	53	138
16	18	31	17	15	10	22	21	33	18	13	12	Cancer				2	2	11	32	46	58	48	21	6		68	158	226
		1										Carbuncle						1									1	1
1		2	2								1	Calculus and Gravel							4	1	1					5	1	6
5	2	6	7	6	5	6	3	3	7	7	8	Cerebro-Spinal Meningitis	15	19	3	14	5	4	3	1		1				36	29	65
4	4	5	3	6		2	4	1	2	4	2	Childbirth				2	15	18	2								37	37
1	2	5	5	29	126	225	123	37	13	3	1	Cholera Infantum	438	131	1											302	268	570
												Chorea				1											1	1
105	105	124	117	106	108	106	105	110	112	113	116	Consumption	35	17	16	125	436	243	161	119	100	58	15	2		622	705	1327
		2	3	2					2	2		Colic	5	1			1	1	2	1						7	4	11
19	18	22	28	33	19	27	22	22	14	15	20	Convulsions	123	103	13	8	2	5	1	2	1	1				151	108	259
30	22	12	12	9	10	8	5	7	19	24	23	Croup	23	130	26	2										93	88	181
5	1	3		1	2	4	3	4	4	3		Cyanosis	30													19	11	30
2		1	2	1	2		4	2	4		4	Cystitis							2	4	6	8	2			20	2	22
8	10	16	10	13	10	20	14	10	14	10	12	Debility and Atrophy	32	8		8	6	12	11	8	32	17	11	2		65	82	147
4	3	2	5		1	1	3	1	3	2	2	Diabetes			1	2	2	3	2	3	7	5	2			18	9	27
2		4	4	3	10	25	32	19	4	4	1	Diarrhea	23	12	4	4	6	4	6	14	16	13	6			49	59	108
17	11	19	18	16	22	19	19	54	48	56	34	Diphtheria	66	165	71	21	9									168	164	332
14	11	15	8	16	8	13	14	6	11	11	15	Dropsy and Anæmia	8	3	1	6	6	14	15	17	26	37	7	2		65	77	142
		1	3	2	4	26	13	11	4		5	Dysentery	14	9	1	2		7	3	6	13	11	3			25	44	69
1					1	1		1			1	Embolism						1		1	2		1			1	4	5
4	3	2	3	8	5	11	10	5	4	3	5	Enteritis	16	6	2	3	8	4	6	1	4	12	1			31	32	63
2	5	3	6	5			1	2		1	2	Epilepsy	2		1	6	2	4	4	4	1	2	1			16	11	27
				2								Execution						2								2		2
							1					Epistaxis							1							1		1
4	1	5	6	5	4	8	4	2	5	6	5	Erysipelas	1	5	2	10	6	6	15	9	1					32	23	55
1	1										1	Exposure							1	1	1					2	1	3
				1								Exophthalmic Goitre							1									1
6	2	3		3	2	2	4	4	3	1		Fever, Congestive	4	2	2	3	3	5	3	4	3	4				18	15	33
2	2	1	2	3	3	1	3	1	7	5	2	Fever, Intermittent	3	1		4	2	3	1	3	3	8	3	1		14	18	32
	1	2		1				1		1	1	Fever, Remittent		1				1	4	1						3	4	7
18	9	18	16	12	9	18	34	36	27	25	20	Fever, Typhoid	17	19	22	42	38	32	18	17	12	20	5			125	117	242
7	8	7	10	16	15	18	16	23	14	7	12	Fever, Typho-Malarial	3	11	12	15	24	17	10	22	18	11	8	2		85	68	153
2		1	4	3	2	5	6	8	4	2	3	Fever, Malarial	1	6	1	3	2	2	3	5	4	5	4	3	1	16	24	40
								1		1		Fistula						1		1						1	1	2

TABLE 7.—Continued.

DISEASE.	January.	February.	March.	April.	May.	June.	July.	August	September.	October.	November	December.	Month not stated.
Gall Stones			1	1	1						2		
Gastritis	4	8	5	10	6	6	7	9	6	5	1	7	
Gout													
Heart Disease	42	38	46	49	41	38	36	48	33	44	29	55	
Hemorrhage	4	4	6	2	3	2	7	3	4	4	3	6	
Hepatitis		2		5	3	1	2	4	1	4	2	1	
Hernia	1		2			1		3	1	3			
Homicide				1			1						
Hydrocephalus	7	3	9	7	3	4	6	7	2	2	1	3	
Hydrophobia		1											
Insanity		1		5	4	7	9	8	6	7	4	2	
Intussusception				1		1		2					
Jaundice				1		1	3	2	2	1	2	2	
Joint Disease	1										1		
Kidney Disease	5	6	4	5	2	2	1	3	2	2	4	3	
Laryngitis	2	2	3	2	1		1				3		
Liver, Disease of	3	3	8	10	6	8	5	6	5	10	7	7	
Leucocythemia		1		1						1			
Lung, Disease of	12	12	10	10	7	10	5	2	8	6	8	10	
Malignant Pustule	1												
Malformations	2	4	2		2			2	2		1	3	
Measles	2	10	10	9	9	5	4	4	1	1	3	1	
Meningitis	10	10	13	16	14	17	23	13	12	12	9	14	1
Mortification	2												
Neuralgia	2		2		2	1					1	1	

DISEASE.	Under 1	1 to 5.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	Over 100.	Age not stated.	Male.	Female.	Sex not stated.	Total.
Gall Stones						1	1	1	1	1					3	2		5
Gastritis	5	2	2	1	5	7	8	8	10	17	7	2			35	39		74
Gout								2							2			2
Heart Disease	21	8	6	21	22	35	56	89	107	101	31	2			232	267		499
Hemorrhage	8	1	1	3	4	7	6	4	6	8					28	18	2	48
Hepatitis	1			1	2	2	2	3	3	8	2	1			16	9		25
Hernia						4	1	2	3	1					9	2		11
Homicide	1	1													1	1		2
Hydrocephalus	37	13	2		1	1									35	19		54
Hydrophobia								1							1			1
Insanity				1	7	5	7	7	12	8	4	2			23	30		53
Intussusception	1				1	1	1								2	2		4
Jaundice	3			1		2	4	2	1	1					7	7		14
Joint Disease			1				1								2			2
Kidney Disease					1	4	3	7	9	10	4	1			28	11		39
Laryngitis	4	3	2	1	1		2	1							8	6		14
Liver, Disease of	1	1			1	4	19	15	17	18	2				47	31		78
Leucocythemia				1			1		1							3		3
Lung, Disease of	15	16	2	2	11	3	10	7	16	10	8				48	52		100
Malignant Pustule					1										1			1
Malformations	15	3													8	10		18
Measles	13	34	7	1	2	2									33	25	1	59
Meningitis	42	60	17	16	5	4	9	7	3	1					96	68		164
Mortification					1	1									2			2
Neuralgia					1		1	2	3	1	1				3	6		9

									1	1			Necrosis						1	1								2			2
3	4	1		3	2	1	3		2	1	1		Nephritis		1		2	5	2	4	2	2	2	1				13	8		21
31	29	31	39	34	36	23	52	55	43	30	34	5	Not Stated	123	40	12	34	24	26	44	46	49	24	13	2			217	200	25	442
46	45	58	39	55	29	52	39	47	38	46	37		Old Age									28	149	275	74	5		204	327		531
	1	2	1	2	5	3	1	1		1	1		Ovarian Tumor						5	2	4	6	1						18		18
	1						1	1	1	1			Ovarian Dropsy						1	1	1	1	1						5		5
					1	1							Phlebitis										1	1					2		2
23	23	33	30	30	25	33	23	25	23	23	33		Paralysis	1	1	1	6	11	23	28	50	65	79	52	6			153	171		324
4	4	3		2		2	1	3	5	1	2		Pericarditis				3	2	2	4	3	4	7	1	1			10	17		27
13	11	8	10	7	14	14	6	11	5	7	7		Peritonitis	14	5	7	10	17	24	8	7	11	8				2	53	60		113
2	2	1	3	1	1		4	3	1		4		Pleurisy			2	3	2	1	6	3	2	2	1				16	6		22
65	86	139	106	63	24	18	17	22	31	44	96	1	Pneumonia	96	72	18	29	37	49	65	84	103	107	41	8		3	390	322		712
18	20	19	27	23	16	18	30	26	20	12	16		Premat'e Birth & Debility	244	1													135	105	5	245
								1	1	2	2		Privation and Neglect	1								3	1	1					4	2	6
	1			1							1		Prostatitis									1	1	1					3		3
3	5	4	2	4	2	2	3	3	4	3	4		Puerperal Fever				5	20	10	3										38	38
1	1		1	2		1		2		4			Puerperal Convulsions					2	10											12	12
	1						1				1		Puerperal Mania						3											3	3
	1								1		1		Purpura						1	1	1								3		3
1		1									1		Quinsy	1	1	1													2	1	3
6	8	9	8	2	7	2	3	4	2	5	4		Rheumatism	1		4	1	2	8	12	10	11	7	3	1				22	38	60
11	3	10	4	3	15	13	3	2	4	9	15		Scarlet Fever	17	42	27	6												47	45	92
4	2	7		3	2	4	6	2	4	4	9		Scrofula	14	4	2	3	5	5	5	2	3	2	2					23	24	47
						1	1	1	1				Skin Disease					1		1	1	1							1	3	4
2	1	2		1	1	2	1	3	2		3		Septicæmia				2		6	6		2	1					7	11		18
2	2	2				3							Small Pox	1	4		1	2	1									4	5		9
					1	1		1	1	1	1		Spina Bifida	6														5	1		6
3	1	2	3	2	3	2	2	3	3	1	1		Spinal Disease	8	2	1	1	3	4	2	1	4						9	17		26
							1			1			Spleen Disease								1	1							2		2
3	1	2	5	3	4	4	4	3	2	3	2		Stomach Disease	4	5	1	1	5	2	4	6	5	2	1				23	13		36
1	2					1	2	1	1	2	1		Stricture of Intestines						2	5	2	2						4	7		11
													Stricture of Urethra																		
30	35	29	20	19	30	32	27	28	32	28	37		Stillborn	343														194	131	18	343
1		1	1	2	1	1	3	4	2	3	2		Sudden	1				6	6	2	1	2	3					14	7		21
3	2	1	1	4	1	2	5	5	2	3			Senile Gangrene							2	2	5	11	9				19	10		29

TABLE 7.—CONTINUED.

January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November	December.	Month not stated.	DISEASE	Under 1.	1 to 5.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	Over 100.	Age not stated.	Male.	Female.	Sex not stated.	Total.
3	1	2		5	4	7	4	8	6	3	5		Suicide				2	7	7	8	14	4	6					32	16		48
							1	2	2				Suicide by Wounds								2		3					4	1		5
				3	3	2		2	1	1	2		Suicide by Poison				1	1	2	4	5		1					7	7		14
1		1						1	1				Suicide by Hanging							1	1	1	1					2	2		4
	1	1			1	4	2	3	1	1	1		Suicide by Drowning				1	5	3	2	3	1						11	4		15
2				2		1	1		1	1	2		Suicide Otherwise					1	2	1	3	2	1					8	2		10
		3					3	3	1				Syphilis	6				1	2	1								3	6	1	10
5	6	5	7	11	7	22	18	9	6	6	5		Tabes Mesenterica	74	21	1	3	1	4	1								63	43	1	107
4	2	3	2	3	6	4	4	5	2	3			Teething	24	14													21	17		38
2	2	1	3	3	2	1	2	1	2		4		Tetanus	10	1	1		1	1	5	1	1	2					15	8		23
1							1	1	2				Thrush	2	3													4	1		5
								1			1		Typhlitis								1	1						2			2
1	3	1		2	2	2	4	1					Tumor					2	2	3	2	5	1	1				3	12	1	16
	1				2	2		2	2	1			Ulcer			1		1			2	5	1					3	7		10
1	1	2				1	3			3	1		Ulceration of Intestines	3					1	3	1	4						6	6		12
		1		2		1	2	2	1	3	2		Uraemia						1	4	3	3	3					5	9		14
	1	2	5	3	5	2		2		1	2		Uterus, Disease of							7	6	4	5	1					23		23
						1	1	1	1				Uterus, Tumor of							1	1	1	1						4		4
					2	1	1	3	2				Violent		1	2	1	1	2		2							6	3		9
3	9	17	6	10	8	17	13	6	5	5	5		Whooping Cough	53	46	5												50	54		104
			1										Worms		1														1		1

TABLE 8.

OCCUPATIONS, AGES, AND SEX.

OCCUPATIONS.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	Over 100.	Age not stated.	Males.	Females.	Sex not stated.	Total.
Agents				1	1	1						3			3
Artists	1											1			1
Actors			1									1			1
Actress			1										1		1
Bakers		3			2							5			5
Banker						1						1			1
Bartenders				2	1							3			3
Barber			1									1			1
Bridge-builder		1										1			1
Brick-maker						1						1			1
Boatman								1				1			1
Brakemen		3										3			3
Brewers					1	1						2			2
Brokers			1		1	1	1					4			4
Burnishers	1	1	2									4			4
Butchers			2	1	5	1						9			9
Brass-founder						1						1			1
Book-keepers		2	2	1			1					6			6
Book-binders							1					1			1
Blacksmiths		4		8	6	10	6		1			35			35
Calkers								1				1			1
Carmen			1									1			1
Cashiers			1									1			1
Carpenters		2	5	8	12	15	16	7				65			65
Carvers						1						1			1
Carriage-painter				4								4			4
Carriage-maker						1						1			1
Cabinet-maker								1				1			1
Coopers				1	1	1	1	1				5			5
Colliers				1			1					2			2
Cooks				1										1	1
Clerks	7	14	4	2	3	2	2							34	34
Clergymen		3		2	2	6	6	1	1			21			21
Cigar-makers		2	2			1						5			5
Contractors		1			2							3			3
Conductors					1							1			1
Carpet-weavers				1									1		1
Coachmen			1									1			1
Cloth Finishers		1			1							2			2
Depot Master							1					1			1
Dentists		1			1							2			2
Drummers				1								1			1
Druggists		1		1	1							3			3
Dress-makers		4	3	2	1								10		10

TABLE 8—CONTINUED.

OCCUPATIONS.	15 to 20	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90	90 to 100.	Over 100.	Age not stated.	Males.	Females.	Sex not stated.	Total.
Domestics	4	8	7	5	9	11	14	9	1				68		68
Dyers			2					1				3			3
Expressmen		1	1	2	1	1						6			6
Engineers		1	3	1	1	1						7			7
Engravers				1								1			1
Factory Hands	30	38	10	10	7	6	1							102	102
Farmers	22	34	24	48	64	130	191	146	19			678			678
Fur-dresser						1						1			1
Fishermen			1		1		1					3			3
Foreman					1							1			1
Gardeners				1			1	1				1			3
Grocers			1		1							2			2
Grinders					1	1						2			2
Hatters	3	12	3	7	5	5	4	5	1			45			45
Hackman		1										1			1
Harness makers		1			1							2			2
Housewives	9	105	91	94	113	138	177	106	23				1256		1256
Housekeepers	7	39	43	47	54	66	77	112	13	1			59		59
House Painters		3	6	2	5	3	2					21			21
Hotel keepers			1	1	4		1		1			8			8
Ice Dealers							1					1			1
Jewelers				1		1						2			2
Joiners			1			1	1	1				4			4
Journeymen		1		1								1			1
Laborers	25	65	47	68	54	68	44	20	4	1		396			396
Lawyers			2	2	3	1	2	2				12			12
Liverymen						1	2					3			3
Lightermen					1							1			1
Liquor Dealers					2							2			2
Locksmiths			1									1			1
Manufacturers	5	1	2	3	4	8	6	4	2			35			35
Masons		1	1	2	2	2	3	2				13			13
Mariners	1	9	5	6	8	4	3	2				38			38
Machinists			3	2	1	1	2					9			9
Merchants		5	6	15	16	14	21	6				83			83
Millers						2	1	2				5			5
Milliners			1	1									2		2
Mechanics	5	30	30	26	27	13	13	8				152			152
Musicians		1	2	2	1	2								8	8
Moulders		1	1	1	2	1						6			6
Nurseryman					1							1			1
Nurses				1				1					2		2
Oysterman							1					1			1
Paupers							1	5						6	6
Paper maker					1							1			1
Peddlers		1		1		1						3			3
Prisoners		1	1		1	1								4	4
Printers		2			1	1						4			4
Physicians			5	3	2	5	8	1				24			24
Publisher					1							1			1
Post-masters			1			1						2			2

TABLE 8.—CONTINUED.

OCCUPATIONS.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	Over 100.	Age not stated.	Males.	Females.	Sex not stated.	Total.
Polishers				2								2			2
Policeman			1									1			1
Quarrymen		2	1	1	2	2	1	1				10			10
Railroad Hands		1	1	1	3	3	1					10			10
Railroad Builders					1							1			1
Restaurant Keeper				1								1			1
Retired Merchant							1					1			1
Saloon keepers				2	2	1						5			5
Salesmen		2	2									4			4
Students	11	2										13			13
Shoemakers	1	2	3	3	3	2	8	5				27			27
Sextons							1					1			1
Seamstress		1	1	2		1	2						7		7
Seamen		1		3	2	1						7			7
Sea Captains			1			2		2				5			5
Servants	2	4	1	5	3	2	3		1					21	21
Shippers				1								1			1
Station Agent						1						1			1
Stagedriver					1							1			1
Scythe maker						1						1			1
Shears-maker					1							1			1
Switchman				1								1			1
Spinner				1								1			1
Superintendents					1	1	1					3			3
Stone Cutters		1		1		1						3			3
Shipbuilders							1	2				3			3
Speculator							1					1			1
Soldiers				1	1							2			2
Sister of Charity		1											1		1
Tailors	1		3		2		1		1			8			8
Tanners							1		1			2			2
Tailoress				1	1	1	2						5		5
Tinker			1									1			1
Teachers		12	5	3		3	2	1						26	26
Tinners	1	2	1		1	3	1	1				10			10
Tax Collector					1							1			1
Type setter	1											1			1
Telegraph Operator	1											1		1	1
Teamsters		1		1		1						3			3
Turners		1	1		1	1						4			4
Undertakers				2								2			2
Upholsterer							1					1			1
Watchmen			1			1						2			2
Washer					1	1								2	2
Washerwoman			1										1		1
Weaver		1		1					1					3	3
Whaler					1							1			1
Woolcarder								1				1			1
Wool Spinner						1						1			1

VITAL STATISTICS OF THE COLORED POPULATION BY COUNTIES.

COUNTIES.	Births.									Marriages.							Deaths.									
	Males.	Females.	Total.	1879.	1878.	1877.	1876.	Aggregate for 5 years.	Average each year.	1880.	1879.	1878.	1877.	1876.	Aggregate for 5 years.	Average each year.	Males.	Females.	Sex not stated.	Total.	1879.	1878.	1877.	1876.	Aggregate for 5 years.	Average each year.
Hartford........	30	25	55	59	46	63	56	279	55.8	3	21	18	23	21	86	17.2	28	27	1	56	54	57	28	24	219	43.8
New Haven......	44	30	74	60	70	46	63	313	62.6	4	38	30	25	33	130	26.	31	31	3	65	79	79	13	87	323	64.6
New London.....	18	14	32	39	22	17	29	139	27.8	6	8	13	11	15	53	10 6	19	17	1	37	23	30	30	11	131	26.2
Fairfield	25	35	60	41	42	49	46	238	47.6	3	8	3	23	19	56	11.2	22	27	4	53	23	42	42	20	180	36.
Windham.......	5	2	7	22	11	8	12	60	12.	2	2	6	2	6	18	3.6	5	2	..	7	20	7	6	7	47	9.4
Litchfield........	11	6	17	16	16	28	11	88	17.6	4	5	4	5	6	24	4.8	11	7	..	18	9	11	15	23	76	15.2
Middlesex.......	1	3	4	6	9	7	5	31	6.2	3	1	3	5	5	17	3.4	3	5	..	8	8	10	5	20	51	10.2
Tolland.........	3	2	5	4	5	8	1	23	4.6	2	..	2	2	2	8	1.6	5	2	..	7	3	4	1	2	17	3.4
Total.......	137	117	254	247	221	226	223	1,171	234.2	27	83	80	96	107	393	78.6	124	118	9	251	219	240	140	194	1,044	208.8

There are eight cases of mixed marriages included in this table. In two the groom was an Indian, the bride a negro; in the other cases the woman was white, the man black, with one exception, when the reverse was the case.

As shown by the table, the births for the last five years exceed the deaths by 130. The marked decrease in the marriages for the last year, only about a third of the average, would seem due to neglect in reporting the colored marriages separately.

BIRTHS.

The total number of births reported is 13,829; this is 222 *less* than last year and 330 *more* than in 1879. The average for the last ten years is 13,904. Full twenty per cent. of the births go unrecorded; this is principally made up in the large cities and in towns where the practice is, to a considerable extent, in the hands of non-resident physicians. In the cities the number of women attended by midwives that are unable to write is one cause of incomplete returns, but a larger percentage is due to those cases where no professional attendant has charge of the case and some woman of experience manages. Instances of this are very frequent and must be of necessity. The French call these *sâge femmes*; they act as nurse and domestic, taking sole charge of the care of the family as well as of the mother and child; they remain from two to three weeks and receive little compensation except their board. The advantages to a poor family of such an arrangement are obvious. A personal canvass in certain localities in one city, by the registrar, resulted in an increase in the returns of over 28 per cent., and even then all the births were not secured. It is more than probable that there were less births than in the preceding year, as that was an exceptionally healthful year, in comparison with 1880 especially, still a completer return of births is one of the objects to be sought for in this department. Similar results exist everywhere, except in a few localities where a complete canvass is made quarterly or oftener, so that we are no worse off in this respect than the rest of the world. A circular of instruction to registrars, printed elsewhere in this report, calls the attention of registrars to several expedients to better this record, and it is hoped next year's returns will show a marked improvement. The returns show in many places that increased care is taken in these registration reports, but there is still room for considerable improvement.

There were 7,275 male births, 6,503 female, 51 sex not stated; the excess of births over deaths 3,421, which represents the natural increase of population. This is less than in 1879 owing to the increased number of deaths, the birth rate per thousand inhabitants is 22.2. The proportion of males to females is 111 males to every 100 females, or 55.5 males to every 44.5 females, the mean rate for the last ten years is 110 males for every 100 females, or 55

males to every 45 females. This is considerably higher than the ratio in England and Europe generally, where the mean ratio is 105 to 100 females.

TABLE ONE.

Counties.	Birth Rate per 1000.	Twin Births.	Illegitimate.
Hartford,	22.2	28	34
New Haven,	24 6	27	35
New London,	21.1	22	23
Fairfield,	20.8	28	23
Windham,	25.4	13	14
Litchfield,	19.6	9	8
Middlesex,	18 8	3	3
Tolland,	19.7	4	6
State,	22.2	134	146

In one case of triplets the parents were deaf mutes; the children died soon after birth. A triple birth was reported from Derby, Wallingford, and Simsbury, in the latter instance they were all males and died soon after birth. The highest birth-rate is that of Windham County, the lowest Middlesex.* The highest birth rate in any town is that of Putnam, 39.1, last year the highest rate was 40.8, the lowest, Sterling 8.3, while several towns show nearly the same, 8.4 or 8.5. As was stated last year the manufacturing towns give much the highest birth-rate; where the foreign population forms the largest percentage there the birth rate is the highest. Singularly the highest and lowest rates are both in the same county, and as last year, the lowest birth rate is the same as the death-rate of the town. The death-rate may exceed the birth-rate, but instances where they are just the same are infrequent. The average number of twin births for the last five years is 137, of illegitimate 141; thus while the number for this year is in excess of 1879 it is very near the average for the last five years. The following table shows the births relative to population in the several counties, and in the cities.

* In last year's report the rate of this county was printed 28.2 instead of 20.2 as it should have been.

TABLE SECOND.

Hartford,	one birth to every				45.0	Hartford,	one birth to every				41.8
New Haven,	"	"	"	"	43.4	New Haven,	"	"	"	"	35.4
New London,	"	"	"	"	46.6	Bridgeport,	"	"	"	"	34.0
Fairfield,	"	"	"	"	47.9	Norwich,	"	"	"	"	42.6
Windham,	"	"	"	"	39.0	Waterbury,	"	"	"	"	36.6
Litchfield,	"	"	"	"	50.0	Meriden,	"	"	"	"	36.8
Middlesex,	"	"	"	"	53.4	New Britain,	"	"	"	"	34.6
Tolland,	"	"	"	"	50.7	Norwalk,	"	"	"	"	57.9
State,	"	"	"	"	45.0	New London,	"	"	"	"	44.1

In the State there was one birth to every 45 of population, as shown by the above table. Windham shows the highest relative proportion—one birth to every 39. The large manufacturing towns there, are to a great extent populated by French Canadians, who are also very prolific. As we have seen, the highest birth-rate was in Putnam. Middlesex is the lowest, having one birth to every 53.4 of population. Tolland comes next, while Hartford is the same as that of the State. Among the cities Bridgeport shows the highest rate—one to every 34; Norwalk the lowest—one to every 57.9. As in the other estimates, the influence of foreign population is very manifest. The factory towns show the same proportionate results.

October has the greatest number of births of any month; September next; then August; May the least number. The difference between the two extremes is 121. September has the greatest number of male births—663; May least; July next, only 3 more than May. October has the greatest number of female births—592; November the least. Of the seasons, autumn has the most births; winter comes next, and spring last. In 1879 there were more births in winter than in summer, or in any other season, although summer stood next. The least number were in spring.

The following table shows the nationalities of the parents where these were not natives of this country. Of course among the native born are many of foreign descent, but of the second generation, that is, their parents were born in America. There are a few nativities not in the table; there were so few representatives, and all in one county. There were 5 Welch, 1 Austrian, 2 Poles, 2 Prussians, 1 Azores Islands.

COUNTIES.	Irish.	English.	Canadians.	Germans.	Scotch.	Swedes.	French.	Portuguese.	Danes.	Italians.	Swiss.	Norwegian.	Bohemian.	American and Foreign.	Mixed Foreign.	Total.
Hartford,	560	73	62	134	6	17	2	..	10	10	1	..	..	330	113	1,318
New Haven,	1,015	95	63	237	8	1	1	..	..	6	1	1	..	414	179	2,021
New London,	252	32	176	25	10	2	1	14	..	1	..	..	..	227	12	752
Fairfield,	421	35	...	100	7	2	2	..	3	4	2	1	2	345	85	1,009
Windham,	100	11	431	3	2	1	..	..	..	2	..	..	..	112	10	672
Litchfield,	173	29	18	27	7	6	3	..	..	..	..	..	..	102	9	374
Middlesex,	115	18	2	13	1	26	..	1	..	1	..	..	..	91	16	284
Tolland,	46	10	42	61	..	..	..	..	..	..	..	..	..	57	10	226
Total,	2,682	303	794	600	41	55	9	15	13	24	4	2	2	1,678	434	6,656

This table includes all where the nativity was stated. There were 194 unreported. By mixed foreign is meant one parent of one nation, the other of another; by American and foreign, where one parent was born in this country, the other was of foreign birth. There was one case of miscegenation, where the parties were one black (the groom black), and one where the groom was an Indian, the bride a negro. The increase over the total of last year is due to the mixed American births which were not included in the table last year, nor were mixed foreign unless the nationalities of both parties were given. The rapid increase in Canadian births indicates the increased immigration as well as a larger birth-rate among them. There are 122 more than in 1879, 219 more than in 1878. There are no other marked changes in the table. The Portuguese are confined mainly to New London County, and indeed outside the city of New London there are but few, even in that county.

The following table shows the age of mothers at the birth of the first to the seventeenth child. This was the greatest number of children reported of any one mother. The table shows comparatively these facts with regard to American and foreign born mothers.

NO. OF MOTHERS AT	American Mothers.							Foreign Born Mothers.						
	14 to 15.	15 to 18.	18 to 20.	20 to 30.	30 to 40.	40 to 50.	Total.	15 to 18.	18 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	Total.
Birth of 1st child....	2	117	390	1,585	368	175	2,637	30	107	682	277	61	..	1,157
2d "	..	8	75	1,152	300	103	1,638	4	69	480	328	42	..	933
3d "	..	2	16	681	419	45	1,163	..	2	475	365	64	..	906
4th "	.	...	2	356	388	47	793	..	2	384	372	61	..	819
5th "	..	...	1	145	292	49	487	..	...	239	358	62	..	659
6th "	..	...	2	79	188	50	319	..	...	84	354	93	..	531
7th "	..	...	...	29	130	36	195	..	1	77	367	65	..	510
8th "	..	...	...	6	47	22	75	..	...	13	88	27	..	128
9th "	..	...	...	1	33	17	51	..	...	4	53	30	..	87
10th "	..	...	...	1	20	9	30	..	...	5	32	27	.	64
11th "	..	...	...	1	14	10	25	..	...	3	20	3	1	27
12th "	..	...	...	.....	5	10	15	..	...	2	15	18	1	36
13th "	..	...	...	.....	2	4	6	..	...	1	3	3	..	7
14th "	..	...	...	.....	.....	...	.....	..	...	1	2	3	..	6
15th "	..	...	...	.....	.....	1	1		...	1	2	2	..	5
16th "	..	...	...	.....	.....	...	.....	..	...	.....	3	...	..	3
17th "	..	...	...	.....	.....	...	.....	..	...	.....	.....	1	..	1
Total....	2	127	486	4,036	2,206	578	7,435	34	181	2,451	2,639	562	2	5,869

The table is more complete than last year, and is one of great value. From the first to the third child the American mothers take the lead, but from the third to the 17th, the Foreign born mothers show the largest totals, indeed beyond the 13th, the American mothers make no showing except one in the column for the 15th child. Singularly enough, the numbers for the 11th child are nearly equal, 25 American to 27 Foreign, for the 9th and 10th, the Foreign are more than double, for the 12th, more than three times the American. There are two Foreign born mothers over 50. This is not as old as one reported last year, where the mother was 69, father 70.

The nationality was not stated in that case. In our next report some valuable percentages can be derived from these and other tables, when we learn from the census returns the number of males and females in each town, and the number of Native and Foreign born. The total number of American and Foreign, including the mixed nationalities, does not differ so much as last year, and so offers a better medium for comparison between the two.

MARRIAGES AND DIVORCES.

There were 4,745 marriages reported in 1880; an increase of 365 over the previous year, or one for each day in the year. The number of marriages reported in 1879 should be increased by seven from Rocky Hill, received too late for insertion in the tables. This increase in the number of marriages is a reflex of the renewed business prosperity and of the confidence in its continuance for some time. Any general depression of business and industries is shown by a marked decrease in the frequency of marriage. The increase indicates an improvement in morals also, as crime, and especially licentiousness, increase with the decrease in the marriage rate, or at least it is so asserted, and with a probability of truth; indeed, I think it has been pretty well demonstrated. The argument however has been made that the crime and licentiousness stood in a causative relation to the decrease of marriages. However this may be the fact of the increase of vice in case of a low marriage rate remains true. Enforced celibacy is assigned as a cause of insanity more prolific than licentiousness, with an imposing array of figures; so in many complicated aspects a high marriage rate is indicative of social prosperity. As this country grows older the marriages in proportion to the population at marriageable ages decrease. The conditions of life become more and more arduous, and the difficulties of procuring a comfortable support for an increasing family grow greater with the density of the population. So that, especially in the middle classes and those living among cultivated and refined surroundings, it is almost out of the question to marry if an accumulated capital be not to the fore, or at least good expectations. The slower rewards to labor and enterprise as population is concentrated is not the whole reason, however. An equally potent one is found in the social tendencies of the age. Marriage is not thought of by the girl of the period unless she can step into as high a place in the social scale as she leaves, if not higher, and be placed in as desirable surroundings. In place of the old idea of two working as one for the prizes of life, and sharing the triumphs or trials as it might be, we find the idea of separate material interests growing stronger, the deciding questions, who can give me the most? how can I the most better myself by marriage? The law also recognizes separate interests in goods and earnings, giving rigorously to each their rights. So far they may, if they choose, continue divorced in thought and inter-

est. Whether an axe is not here laid at the root of the tree of family life, is a question; but this divorced interest in goods and chattels may lead to a divorced interest in other relations. Of course the property rights of married women should be respected; but it is a question if legislation is not going too far in this direction, and too much individualizing relations that should be, to say the least, dual. The tendency of modern life is setting strongly in this direction, threatening great danger to family life and the best interests of society. The modern culture of women if carried to its logical outcome will result in the complete destruction of home and family life. It is to be hoped that the reaction will soon set in, and that it can be seen that while the individual has rights, there is something higher and holier, better worth securing, than complete individualization at the sacrifice of family ties, even in the outcome of duties that require more or less self-abnegation.

Of the 4,745 marriages, there were 3,055 where both parties were born in America, but it is impossible to tell by the returns what ratio are of foreign descent within the last generation or two; 1,012 were where both parties were born in different foreign countries. In 258 the husband was born in this country, the wife an emigrant; in 372 the husband was an emigrant and the wife born in this country. In these cases both parties are almost always foreign one generation back; that is, their parents emigrated to this country. There were 48 marriages where the nationalities of the parties were not stated. The husband resided in other states in 358 cases, and there were 123 marriages where neither party were residents. The proportions are about the same as last year. There was but one town this year where there was not at least one marriage celebrated—that was in Lisbon—as one town last year was reported as having no marriages when it was afterwards found there had been seven—Rocky Hill, this year postal cards were sent to each registrar in the towns where no marriages were reported, and the number reduced from four to one. Where there are but few returns to report there are more often omissions than in those more complicated. In four towns one marriage each was reported—Marlborough, Beacon Falls, New Fairfield, and Chaplin; their aggregate population as given by the last census was a little over two thousand, the average 547. Four towns reported two marriages each—East Granby, Wolcott, Sherman, and Bethlehem; their aggregate population less than three

thousand, average 682. Six reported three marriages each, 13 four each, while there were many that returned less than a dozen.

The following table shows the ages of the parties at marriago and the number of second, third, and fourth marriages. Although the return of marriage requires the applicant to state whether he or she had previously been divorced, the returns are not made upon that point, if attention be paid to it. It is intended to request registrars to pay particular attention to this hereafter, and to provide for returns of the facts upon the abstracts. There wero two cases reported of women marrying for the fourth time, and three of men; last year there were two men, no women. Sixteen women married their third husbands, against six last year; and twenty-four men their third wives—last year twenty-two. There were 683 widowers that tried matrimony the second time, and 462 widows. There were 4,145 brides who had not before been married, and 3,915 men that for the first time entered into matrimony. The number of women marrying for the first time exceed the men by 230, while 221 more widowers than widows marry again, thus disposing of all but nine of the 230; so that these nino must, whilo themselves marrying for the first time, have been either number three or four to their husbands. The men show the greatest disposition to marry, judging from the table, as there are 230 more that remarry. On the other hand, women marry younger than men, as shown by the table. The age at which men marry is another indication of the increasing complexity of our social relations. The easier a subsistence is acquired the younger men marry; the harder the requirements the longer before marriage can be indulged in. It is not wholly true that marriages are delayed becauso it is harder to earn a living, but that more than a mere subsistence is required. What would have supported a family when our fathers married will barely support one person now, leaving little surplus. In the matter of increased expenditure required there is but little difference in favor of either sex. The youngest brido reported was 12 years of age, and there were four of 14 years; from fifteen to twenty there were 663 more women married than men; from twenty to thirty the males exceed the females by 325; nearly half the excess is in second marriages. From thirty to forty the males are in excess 209, mostly in first marriages.

Table Showing Ages at Marriage.

BRIDES.	12.	14.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70	70 to 80.	80 to 90.	Total, 1880.	Total, 1879.
First Marriage,...	1	4	860	2,685	489	82	20	4	..	..	4,145	3,817
Second "	..	..	...	134	180	96	28	14	10	..	462	411
Third "	..	..	...	......	...	5	6	5	..	..	16	6
Fourth "	..	..	...	......	...	...	1	1	..	:	2	.....
Total,...........	1	4	860	2,819	669	183	55	24	10	..	4,625	4,234
GROOMS.												
First Marriage,...	..	..	198	2,884	683	98	43	6	3	..	3,915	3,630
Second " ...	..	..	9	260	195	114	59	32	10	4	683	580
Third " ..	..	..	...	......	...	2	12	5	4	1	24	22
Fourth " ...	..	..	...	......	...	...	2	..	1	..	3	2
Total,...........	..	..	207	3,144	878	214	116	43	18	5	4,625	4,234
Not reported,....	..	..	...	......	...	...	...	..	..	..	120 4,745	

From 40 to 50 there is a slight excess of males; from 50 to 60 more than double the number; and here we have the first instances of fourth marriages. The rest of the table shows a slight excess of males at each period. There was a less number of unreported cases this year than last.

DIVORCES.

The tendency to individualization of interests has already been noticed. It is stated by Woolsey* that the number of divorces did not begin to increase with much rapidity until near the middle of the present century, and that Connecticut took the lead in this movement. In 1843, "habitual intemperance" and "intolerable cruelty" were added as grounds for divorce. Six years later, "imprisonment for life," "bestiality or other infamous crime," were added, and the famous omnibus clause, "and any such misconduct of the other party as permanently destroys the happiness of the petitioner and defeats the purpose of the marriage relation." Unfortunately, I have been unable this year to obtain the number of divorces previous to 1860. For four years from that date there was one

* Essay on Divorce and Divorce Legislation.

divorce to every 13 marriages: from 1864 to 1878 inclusive there were, as shown by the table on page 8, an average of over 400 divorces each year, and an average of nearly one divorce to every 10 marriages. Since the repeal of the omnibus clause, there has been a marked decrease in the number of divorces, and a ratio of one divorce to every 13.9 marriages. The statement that this was probably due to the repeal of the omnibus clause was severely criticised by a writer in the New York *Times*. Apparently the principal argument was that it was impossible to determine from one year's returns. Of course it is absolutely, but two years successive decrease affords strong presumptive evidence. The fact that divorces had thus decreased was, one would almost infer, urged as an argument for the restoration of the omnibus clause. As nearly as could be gathered from a critic to whom I submitted the article, the only argument needed to establish the truth of the assertion would have been an *increase* in the number of divorces for the two years, if a decrease was evidence against that view. The increase in the number of marriages was urged as one reason for the fallaciousness of the theory, but, as has been before stated, if that increase be neglected, the figures are nearly as favorable as in 1879. The returns received this year so far are favorable to the theory of the repeal causing a decrease. Of course they are not complete as yet.

In other states the history of divorce has shown increase also. In New Hampshire there was an increase of 50% in 8 years—1870-78. Vermont, in 1860, one divorce to 23 marriages; in 1878, one to fourteen. In Maine, the Rev. Mr. Dike states that the ratio of divorces to population is greater than in Connecticut. In Massachusetts, for 20 years there has been an increase from one divorce to every 51 marriages to one to every twenty-one.

On the basis of the present census, Mr. Dike, in a recent lecture, states that there is one divorce for every 1357 inhabitants in Maine, one to every 1443 in New Hampshire, one to every 1687 in Vermont, one to every 2973 in Massachusetts, one to every 1553 in Connecticut, one to every 1411 in Rhode Island Tolland county, Conn., is stated to have been the worst county in the United States for a few years. There is one noticeable fact, that generally the more sparsely settled a place is the higher is the rate. If there were only two marriages and one divorce, the ratio would be very high. This must be remembered in regard to Tolland county. In medical statistics such statements would be dis-

credited at once. If there had been one fatal case in two, the percentage of mortality thus derived would be fearful, or if only one and successful, equally unreliable. Statistics do not prove unless every relation is taken into account.

To darken the picture, it is stated that at least a quarter of the marriages are among Romanists, amid whom divorce is unknown. This would make the ratio to protestant marriages in Massachusetts 1 to 15, Vermont 1 to 13, Rhode Island 1 to 9, Connecticut 1 to 8. It must be remembered, however, that many come into Connecticut to gain a residence for the distinct purpose of obtaining a divorce. This is true to a large extent, and was more so before the repeal of the omnibus clause. This, therefore, should show a greater decrease for some years to come after the present docket has been cleared.

As managed at present, it is impossible to learn anything more than the barest outline concerning those obtaining divorce. Applicants for divorce should be required to fill out a blank, to be furnished by the Bureau of Vital Statistics, which should contain a full statement of all the facts necessary to know, in order to study the causation of divorces intelligently ; and this should be a bar to further advance in the process of obtaining a divorce until filled in all essential particulars.

The best place to register these applications would be either at the office of the Clerk of the County Court or with the registrar of births, marriages, and deaths. From conversation with various county clerks, I learn that many instances of what might be called *rounders* occur, that is, a party once divorced keeps up the habit. One such case came under my observation. The lady came to this state from New York, to which state we are indebted for a large proportion of our divorce emigrants, and since locating here has been divorced three times, and apparently is good for as many more. That this frequency of divorce indicates a general looseness of morals does not appear probable ; certaiuly the ratios in the different states are no just criteria of the proportionate amount of immorality.

The following tables give all the facts that can be definitely ascertained under the present system of returns :

Number of Divorces by Counties in 1880 and Preceding Years.

County.	Husband's Petition.	Wife's Petition.	Total. 1880.	1879.	1878.	1877.	1876.	1875.	1874.	1873.
Hartford, ...	7	42	49	51	74	72	91	73	86	70
New Haven, ...	22	74	96	84	111	97	103	52	131	107
New London, ..	5	27	32	35	52	44	54	51	63	67
Fairfield, ...	16	47	63	63	74	92	58	73	76	71
Windham, ...	6	27	33	27	28	35	17	36	46	51
Litchfield, ...	11	21	32	23	23	36	25	45	39	40
Middlesex, ...	2	9	11	14	18	23	21	25	18	25
Tolland, ...	5	11	16	19	21	28	27	21	33	26
Total, ...	74	258	332	316	401	427	396	476	492	457

The number of divorces to marriages for 1880 in Hartford Co., 1 to 20; New Haven, 1 to 12.8; New London, 1 to 20; Fairfield, 1 to 11, as also Windham and Litchfield; Middlesex, 1 to 24; Tolland, 1 to 13. The large percentage of cases in which the wife is the petitioner is a very noticeable feature, although not a strange one. It is about the usual proportion. The next table, as to causes, is somewhat mixed, as several causes are often assigned. They have been kept as separate as possible.

Causes.

	Hartford County.	New Haven County.	New London County.	Fairfield County.	Windham County.	Litchfield County.	Middlesex County.	Tolland County.	Total.
Adultery, ...	8	22	14	6	5	8	1	3	67
Intemperance, ...	10	33	11	12	11	6	3	3	89
Infamous Crime, ...	..	..	1	..	..	..	..	..	1
Cruelty, ...	8	21	7	9	5	7	1	3	61
Desertion, ...	24	36	12	35	14	16	6	7	150
Fraudulent Contract,	..	1	..	..	..	..	..	..	1
Misconduct, ...	..	..	..	..	..	..	..	..	...
Life Imprisonment, .	..	..	..	..	..	..	..	..	...
Imbecile, ...	..	..	1	1	..	..	..	..	2

Desertion stands easily first among the causes, although sometimes associated with others. Intemperance ranks next, while adultery, which the Divorce Reform Association would make the principal cause, ranks an easy third. However it may be on moral grounds, I fail to see the advantages to society of making adultery the sole cause. Cruelty, this year, comes very near adultery in frequency as a cause, and this is about the ratio for a number of years. To compel a woman to live with a man who is an intolerable drunkard, or cruel to extreme, or to endure long years of solitude because her liege lord chooses to travel abroad, is of questionable utility. No doubt the process would result in increasing the number of angels somewhat, if the total abnegation of self and constant torture contribute to that end, as in the case of the saints on the calendar, many of them. But that the general stock of morals would be improved thereby, looks a little untenable. The question is a profound one, but here is a good place to advance slowly. Let us be sure that our facts are comprehensive and exact in the consideration of these very complicated relations, before a perfect system is attempted, for these often prove awkward mechanisms if carelessly constructed. A law requiring applicants for divorce to be registered, has been introduced this year. It is a move in the right direction; a blank should be required stating how long the parties have been residents of the State, their nativity, and whether they have been previously divorced.

CAUSES OF DEATH.

The tables of deaths this year are so complete as to leave little to add in the way of comment. When the details of the recent census are obtainable, the field will be open for a full discussion of the relative mortality among the native-born and foreign population. When the relative population of each town is learned, at different ages, the number of adults and children will afford a basis for tables of comparative mortality at different periods.

The experience of the last year has been of value in demonstrating the value, power, and absolute need of sanitary science and of practical sanitation in every town, and, indeed every house in the state. The protection afforded us by vaccination against that dreadful scourge, small-pox, has been emphasized by the prevalence of small-pox in those places and among those people that were unvaccinated; where, for a long time, vaccination had been neglected. While in Hartford and other places, case after case have been brought; in fact, one or two patients, with fully-developed small-pox, were discovered parading our streets; and a nurse, right from a small-pox hospital where one patient had died of malignant small-pox and others were very ill, spent a morning in that occupation so delightful to the hearts of some people, shopping, while reeking with infection—wearing the garments that but a half-hour before were sweeping across the precincts of a pest-house. Yet no other cases were caused by these reckless acts; indeed, since vaccination has been so thoroughly attended to by the city fathers, no cases have spread from the repeated introduction of cases of small-pox. A thorough law for the protection of the public against the danger of concealed small-pox, as far as the law can reach it, and from the danger of conveying disease from the transportation of dead bodies, has been introduced into the present legislature, and it is hoped that it may pass. It also provides against the scattering of contagious diseases by schools to a considerable extent; one of the readiest methods of starting an epidemic of scarlet fever or diphtheria.

MALARIA.

Last year, the rapid increase in malarial diseases for the past few years was mentioned. This year, in connection with this, I desire to call attention to the renewed frequency of typhoid fever,

without any diminution in the relative increase of malarial deaths. That is, the increase over last year's number of deaths shows no decrease from the increase of typhoids. This year will show a still greater number of deaths, from typhoid and malaria both, judging from the returns already made. This, however, is somewhat anticipative. The same relative increase in typhoid fever is shown in Massachusetts especially; also in other states. Malarial diseases, too, have become fairly prevalent in Massachusetts, having reached the headwaters of the Housatonic very nearly, and have also extended far up the valley of the Connecticut. Nearly every county in that state has had more or less malaria. In our own state the complete invasion of the eastern part is foreshadowed by the appearance of the usual forerunners of malaria: the bilious remittents, neuralgias, malaise, and increased power and value of quinine. The disease has also alighted in several spots. Among the first selected was Thompson, in the extreme northeastern corner of the state; a hilly town, with a dry, sandy soil, and nothing apparently in the locality to invite malaria. So of the other spots selected about the same remarks could be made. Tolland county receives the disease more gradually by direct extension from town to town. The progress by this method is also variable—usually slow. An epidemic year will lend it wings.

The following table shows the relative frequency of deaths from typhoid fever and malaria for the last twelve years, including 1880:

	Deaths from Cerebro-spinal meningitis.	Deaths from Typhoid fever.	Deaths from Malarial fevers.
1869,	..	458	9
1870,	..	427	15
1871,	..	352	19
1872,	..	506	29
1873,	..	430	30
1874,	..	370	38
1875,	..	449	21
1876,	..	327	22
1877,	39	321	73
1878,	47	252	143
1879,	59	159	198
1880,	65	242	265

CEREBRO-SPINAL MENINGITIS.

This disease has become endemic in this state, and especially over the region that has been invaded by malaria. The same agencies, or similar, that induce malaria seem to induce this disease also. Their relationship, apparently, is a close one. The table shows the mortality from this disease also for the last four years. Previously to that the deaths are included with those from meningitis, as there were but few, unless it were in exceptional years. The deaths are not confined to the malarial region, but are more numerous there.

TUBERCULAR CONSUMPTION.

The question has been raised whether or no there has been any decrease in the frequency of consumption. That there has been a very marked decrease in some places is very certain; and were it not for the large number of deaths from this cause among the foreign population, especially the Irish and those descended from Irish emigrants, although not confined to them, including in a very marked degree those of this class living in manufacturing towns and cities who work in mills and factories, there would be a very decided decrease in the deaths from consumption. The decrease in the towns where the factory and foreign population is very small is striking; in some places deaths are infrequent. The mortality among the native population is decreasing, while that of the foreign born and their immediate descendants is increasing. The greatest mortality here as elsewhere is among those that live and work much indoors and breathe impure air; that is, air that has beeu once or more through the lungs, and each time some products of decay added to its composition. The influence of the various miueral and animal dusts, together with some of vegetable origin, arising from different trades and manufactures, are well known; but these, harmful as they are, are not to be mentioned beside the disease and death caused by rebreathing again and again air loaded with the products of decay of various human tissues, often including the products of degenerative disease. The predisposition to acute lung diseases, bronchitis, lung fever, and the like, by breathing impure air, is well known; such air irritates the lungs, causes chronic congestion, and thus in those predisposed to consumption hastens its development. When exposed to the chill cold of the outside air, the circulation of the already congested tissues of the

lungs is unable to respond to the stimulus and move with rapidity increased in proportion to the cold, but becomes still more stagnant, until a condition equivalent to disease is produced, and thus acute diseases are the direct resultant of impure air. When the poisons of sewer gases and like contaminations are superadded to those just mentioned, the irritation and congestion are enough to cause catarrhal troubles and even lung fever without any additional exposure. This form of pneumonia is quite fatal, and for want of a better name is called pyogenic pneumonia.

There has not been an increase in the mortality from consumption quite sufficient to account for the relative increase in population; so that there has been a decrease in mortality to some extent. This can justly be ascribed to better attention to sanitation, partly to better ventilation. For instance, it is now the exception rather than the rule for air from the cellar to be taken for the furnace, but the cold air box opens outside, and quite generally care is taken that it does not open near any possible contaminating sources. Our school-houses are better ventilated, especially in the larger towns and villages, and in the construction of houses and places of public assemblage the architect is oftener required to pay attention to sanitary requirements, and in school-houses water-closets are seldomer put in basements. These are mentioned not as anything like a complete list of the sanitary improvements of the age, or of the more important ones, but simply to illustrate the fact that greater attention is now paid to securing pure air than formerly. Although the conditions in this respect are often enough execrable now, still there has been progress in this and other lines. Increased attention to drainage should be mentioned in this connection, as the relation of subsoil moisture to the development of consumption is well known.

The decrease in the mortality and frequency of consumption has been assigned to the effect of malaria, reasoning from the decrease in the frequency and mortality from typhoid fever apparently caused by malaria, and at least coincident with its appearance, if not a precursor of it.

In investigating this opinion I have found no ground for it, for precisely opposite results are found, that is an increased frequency and mortality where malaria prevails, is perhaps quite as often as a decrease, and no change whatever is as frequently reported. The instances where there is a marked decrease are very few in number, but in several of them the decrease is quite marked.

There is in all no very great decrease in the frequency of consumption, but what there is was evidently not due in any measure to the prevalence of malaria. The table on page 63 shows the comparative mortality for five years; also that for each year the average is 1,311, that for 1880, 1,327.

INFANTILE DEATHS.

The deaths of those under five, this year, are largely in excess of last year; more than half the increase over the mortality of last year is due to this class. The percentage to total mortality was 31.5, while in 1879 it was 28.3, an increase of over three per cent. This is largely due to climatic causes, the largest percentage is made up from cholera infantum, that is, of that part caused by disease. The effects of malaria in causing infantile debility and death are also to be seen here, and add their quota to swell the list. A large infantile death-rate is an indication of anything but a good sanitary condition. The percentage this year, while larger than that of last year, is still not above the average, but the average shows a condition that should be improved upon. There is a small increase in all periods over last year, but slightest in the last, those from old age. The greater number of deaths too occur in summer, although from the protracted heated term, diarrheal diseases continued until late into the autumn, and early winter.

PNEUMONIA AND ACUTE LUNG DISEASES.

The frequency and mortality from pneumonia have increased rapidly for the last two or three years, but have not yet reached that of 1879, which was an exceptional year. As seen by the table, the deaths exceed the average for the last five years by 102. The rapidly transitional changes of the weather is doubtless one of the principal causes, still we find it extending into the early summer to an extent and degree quite unusual.

The increase in other acute lung diseases, while marked, is not as extensive as that in pneumonia. As stated previously, the increased mortality is largely due to climatic changes, as we have already discussed the causes of much more than half of the increase, and the causes have been principally climatic.

DISEASES OF THE NERVOUS SYSTEM.

The increasing ratio of deaths from nervous diseases is an interesting question for study in vital statistics. This has been marked for the last two years especially. Thus the deaths this year and

last, from insanity, are each double those in 1877, and more than three times those in 1876. The increase in other forms while regular and decided is not as great as in insanity. The great strain upon men in modern times to keep up in the race, to say nothing of excelling others, puts a great burden of care, worry, and anxiety upon the mind. The overtasked mind is not allowed sufficient rest, and recreation is a thing unthought of, hence comes the inevitable result, disease or a complete overthrow of the mental powers. The great cause of mental and nervous disease is overwork and anxiety, and of the two, worry is the most potent. Many men are hurried into wreck by the pressure of care and anxiety, so that any relaxation, to say nothing of rest, or recreation, is out of the question, and indeed the word is well named, or the thing rather for which it stands, for it is indeed a re-creation to lay aside all anxiety and care and enjoy some form of amusement to the full. But to those that find no relief, even in sleep, from the load of care, the rest of death or madness comes at length.

DEFECTS IN REGISTRATION.

The following circular, describing the present greatest evils in obtaining correct returns, was issued and sent during the present year to the registrars:

BUREAU OF VITAL STATISTICS.

To the Registrars of Births, Marriages, and Deaths of the State of Connecticut.

GENTLEMEN:

As the general superintendence of the system of registration of Births, Marriages, and Deaths devolves upon this board, it therefore becomes our duty to call your attention to any measures that will improve this department, and to any features that require correction. Any suggestions that your experience may suggest will be welcome, and receive due attention. The law gives you ample power to compel complete returns, and, indeed, the accuracy and thoroughness of the record depends upon your zeal and fidelity to a very great extent. The following topics invite consideration at this time, arranged somewhat as to their relative importance. 1. The full name of the child in the birth records. 2. The returns from non-resident physicians. 3. The prevention of

improper use of the returns of Births and Deaths. 4. The safe keeping of the records. 5. The regulation of returns from sextons and those having charge of cemeteries and the registration of burials and removals in the records of cemeteries, and the enforcement of the law requiring removal permits.

The first is beset with the greatest difficulties. The law giving the registrar ten cents for every record of birth incomplete, in regard to the name of the child that he completes, has in some places increased the percentage of names to a great extent, but has not secured complete returns in this respect. It is suggested that in the smaller towns a postal card sent to the parents at the close of the year would, in most cases, secure a satisfactory reply. In view of this difficulty, the Board have issued Birth Blanks bound in book form, with a stub attached, to be retained by the physician and completed at any future visit he may make during the year. It also enables the physicians to preserve records of this part of their professional business with very little trouble. It also prevents waste, as the unused blanks are kept clean and are not readily lost. Registrars are requested to use every means in their power to secure complete returns of births. In some instances, a personal canvass through certain localities in the larger towns has increased the returns ten to twenty per cent. The compensation allowed the registrar in such cases amply repays the time thus spent.

The second difficulty is nearly as great. In some instances returns of births are made to the town in which the doctor resides, while oftener both births and deaths thus attended go unrecorded. The returns of births and deaths show this glaringly where towns are thus situated, the death rate from the returns being many times lower than the most liberal estimates of the greatest possible duration of life give, so much less as to show at once the incompleteness of the returns. The law, which was submitted to the legislature to correct this evil, provided for compulsory returns by letter, and payment of fees to non-resident physicians by letter by the registrars. Unfortunately, *shall* was changed to *may*, and the penalty for non-compliance stricken out, so no relief was afforded. It is, however, in the power of registrars to compel returns from such physicians, and postal card notifications of the law, and that it will be enforced, will be supplied registrars on application, to serve upon such physicians. If no regard be taken of such notice, we advise that the case be put into legal hands to secure compli-

ance without suit, if possible, but to break up this persistent disregard of law, and secure this large percentage of births and deaths that now are unrecorded.

The attention of registrars is called to the improper use of the returns, in the publication of the *names* of persons that have died, *in connection with the diseases of which they died*, and of the number of deaths or births returned by physicians or midwives. Such abuse of the records should forfeit the right to use them, and registrars are hereby instructed to prevent such abuses by all means in their power, and in case of persistence, after due warning, to forbid such trespassers access to their books; furnishing always, to all, such data and information as are proper for publication or information. The number of births and deaths, and the number dying or born in any given period of time, or the number dying from each disease, are all facts that the public are entitled to know, also the number born or dying in any ward, street, or locality; but the names in connection with the disease, or the names of attendant physicians in connection with any statistical report, are matters of private, not public concern. Strict adherence to this rule is required.

In towns where no safe has yet been provided, the returns and records are often exposed to great risk of loss. Registrars are requested to use the greatest care in keeping their record books safely, and also in perserving the original certificates, which in case of a change in office should be transferred to the new incumbent intact. Attention is also called to the importance of filing a duplicate copy of the yearly abstract with the town clerk.

The importance of keeping a record of burials and removals at the office of the cemetery is obvious. The law in this respect is too often disregarded. Where such records are faithfully kept they are of the greatest assistance to the registrar in securing a complete numerical return of deaths, in addition to the relations of such records to the public welfare.

The registrar is the only person that can secure a due enforcement of the registration laws. Of course, it is the duty of every good citizen to obey the laws, and physicians are supposed to have a special interest in these returns. Unfortunately, these inducements cannot be entirely relied upon to secure satisfactory results; dependence then comes upon the public spirit and fidelity to duty of the registrar. This is a surer reliance than any of the others,

and while commending the efforts that have been made, and the results achieved, we suggest these topics for your careful consideration, and request your heartiest co-operation in making this service a model for all other states. Our laws and methods are now conceded to be among the best. It is our duty to see that the results shall be commensurate.

By Order of the Bureau of Vital Statistics,

C. W. CHAMBERLAIN, M.D.,

Superintendent.

ERRATA.

Page 11. The lines for Old Lyme and Preston are transposed all through after the population, so what reads as Old Lyme should be for Preston, and *vice versa.*

Page 14. The same for Norfolk and North Canaan.

Page 17. In the total deaths for Middlesex County, 5 dropped out. It should be 540, not 40, as printed.

Page 23. The total for Class IV should read 265 instead of 255, as printed.

Page 29. The total male deaths in Class III should be 55, not 54, as printed.

Page 40. Watertown is printed Waterbury.

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